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# LED TV

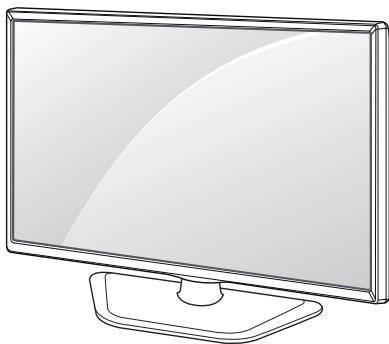
# SERVICE MANUAL

CHASSIS : LD3AF

MODEL : 55LN549E 55LN549E-ZE

## CAUTION

BEFORE SERVICING THE CHASSIS,  
READ THE SAFETY PRECAUTIONS IN THIS MANUAL.



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# SAFETY PRECAUTIONS

## IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by  $\triangle$  in the Schematic Diagram and Exploded View.

It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent Shock, Fire, or other Hazards.

Do not modify the original design without permission of manufacturer.

### General Guidance

An **isolation Transformer should always be used** during the servicing of a receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks.

It will also protect the receiver and its components from being damaged by accidental shorts of the circuitry that may be inadvertently introduced during the service operation.

If any fuse (or Fusible Resistor) in this TV receiver is blown, replace it with the specified.

When replacing a high wattage resistor (Oxide Metal Film Resistor, over 1 W), keep the resistor 10 mm away from PCB.

Keep wires away from high voltage or high temperature parts.

### Before returning the receiver to the customer,

always perform an **AC leakage current check** on the exposed metallic parts of the cabinet, such as antennas, terminals, etc., to be sure the set is safe to operate without damage of electrical shock.

### Leakage Current Cold Check(Antenna Cold Check)

With the instrument AC plug removed from AC source, connect an electrical jumper across the two AC plug prongs. Place the AC switch in the on position, connect one lead of ohm-meter to the AC plug prongs tied together and touch other ohm-meter lead in turn to each exposed metallic parts such as antenna terminals, phone jacks, etc.

If the exposed metallic part has a return path to the chassis, the measured resistance should be between 1 M $\Omega$  and 5.2 M $\Omega$ .

When the exposed metal has no return path to the chassis the reading must be infinite.

An other abnormality exists that must be corrected before the receiver is returned to the customer.

### Leakage Current Hot Check (See below Figure)

Plug the AC cord directly into the AC outlet.

### Do not use a line Isolation Transformer during this check.

Connect 1.5 K / 10 watt resistor in parallel with a 0.15  $\mu$ F capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.

Measure the AC voltage across the resistor using AC voltmeter with 1000 ohms/volt or more sensitivity.

Reverse plug the AC cord into the AC outlet and repeat AC voltage measurements for each exposed metallic part. Any voltage measured must not exceed 0.75 volt RMS which corresponds to 0.5 mA.

In case any measurement is out of the limits specified, there is possibility of shock hazard and the set must be checked and repaired before it is returned to the customer.

### Leakage Current Hot Check circuit



When 25A is impressed between Earth and 2nd Ground for 1 second, Resistance must be less than 0.1  $\Omega$

\*Base on Adjustment standard

# SERVICING PRECAUTIONS

**CAUTION:** Before servicing receivers covered by this service manual and its supplements and addenda, read and follow the **SAFETY PRECAUTIONS** on page 3 of this publication.

**NOTE:** If unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions on page 3 of this publication, always follow the safety precautions. Remember: Safety First.

## General Servicing Precautions

1. Always unplug the receiver AC power cord from the AC power source before;

- Removing or reinstalling any component, circuit board module or any other receiver assembly.
- Disconnecting or reconnecting any receiver electrical plug or other electrical connection.
- Connecting a test substitute in parallel with an electrolytic capacitor in the receiver.

**CAUTION:** A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.

- Test high voltage only by measuring it with an appropriate high voltage meter or other voltage measuring device (DVM, FETVOM, etc) equipped with a suitable high voltage probe. Do not test high voltage by "drawing an arc".
- Do not spray chemicals on or near this receiver or any of its assemblies.
- Unless specified otherwise in this service manual, clean electrical contacts only by applying the following mixture to the contacts with a pipe cleaner, cotton-tipped stick or comparable non-abrasive applicator; 10 % (by volume) Acetone and 90 % (by volume) isopropyl alcohol (90 % - 99 % strength)  
**CAUTION:** This is a flammable mixture.  
Unless specified otherwise in this service manual, lubrication of contacts is not required.
- Do not defeat any plug/socket B+ voltage interlocks with which receivers covered by this service manual might be equipped.
- Do not apply AC power to this instrument and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.
- Always connect the test receiver ground lead to the receiver chassis ground before connecting the test receiver positive lead.  
Always remove the test receiver ground lead last.
- Use with this receiver only the test fixtures specified in this service manual.  
**CAUTION:** Do not connect the test fixture ground strap to any heat sink in this receiver.

## Electrostatically Sensitive (ES) Devices

Some semiconductor (solid-state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor "chip" components. The following techniques should be used to help reduce the incidence of component damage caused by static by static electricity.

- Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed to prevent potential shock reasons prior to applying power to the unit under test.

- After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
- Use only a grounded-tip soldering iron to solder or unsolder ES devices.
- Use only an anti-static type solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ES devices.
- Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
- Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
- Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.  
**CAUTION:** Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.
- Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device.)

## General Soldering Guidelines

- Use a grounded-tip, low-wattage soldering iron and appropriate tip size and shape that will maintain tip temperature within the range of 500 °F to 600 °F.
- Use an appropriate gauge of RMA resin-core solder composed of 60 parts tin/40 parts lead.
- Keep the soldering iron tip clean and well tinned.
- Thoroughly clean the surfaces to be soldered. Use a mall wire-bristle (0.5 inch, or 1.25 cm) brush with a metal handle. Do not use freon-propelled spray-on cleaners.
- Use the following unsoldering technique
  - Allow the soldering iron tip to reach normal temperature. (500 °F to 600 °F)
  - Heat the component lead until the solder melts.
  - Quickly draw the melted solder with an anti-static, suction-type solder removal device or with solder braid.  
**CAUTION:** Work quickly to avoid overheating the circuit board printed foil.
- Use the following soldering technique.
  - Allow the soldering iron tip to reach a normal temperature (500 °F to 600 °F)
  - First, hold the soldering iron tip and solder the strand against the component lead until the solder melts.
  - Quickly move the soldering iron tip to the junction of the component lead and the printed circuit foil, and hold it there only until the solder flows onto and around both the component lead and the foil.  
**CAUTION:** Work quickly to avoid overheating the circuit board printed foil.
- Closely inspect the solder area and remove any excess or splashed solder with a small wire-bristle brush.

### IC Remove/Replacement

Some chassis circuit boards have slotted holes (oblong) through which the IC leads are inserted and then bent flat against the circuit foil. When holes are the slotted type, the following technique should be used to remove and replace the IC. When working with boards using the familiar round hole, use the standard technique as outlined in paragraphs 5 and 6 above.

#### Removal

1. Desolder and straighten each IC lead in one operation by gently prying up on the lead with the soldering iron tip as the solder melts.
2. Draw away the melted solder with an anti-static suction-type solder removal device (or with solder braid) before removing the IC.

#### Replacement

1. Carefully insert the replacement IC in the circuit board.
2. Carefully bend each IC lead against the circuit foil pad and solder it.
3. Clean the soldered areas with a small wire-bristle brush. (It is not necessary to reapply acrylic coating to the areas).

### "Small-Signal" Discrete Transistor

#### Removal/Replacement

1. Remove the defective transistor by clipping its leads as close as possible to the component body.
2. Bend into a "U" shape the end of each of three leads remaining on the circuit board.
3. Bend into a "U" shape the replacement transistor leads.
4. Connect the replacement transistor leads to the corresponding leads extending from the circuit board and crimp the "U" with long nose pliers to insure metal to metal contact then solder each connection.

#### Power Output, Transistor Device

##### Removal/Replacement

1. Heat and remove all solder from around the transistor leads.
2. Remove the heat sink mounting screw (if so equipped).
3. Carefully remove the transistor from the heat sink of the circuit board.
4. Insert new transistor in the circuit board.
5. Solder each transistor lead, and clip off excess lead.
6. Replace heat sink.

#### Diode Removal/Replacement

1. Remove defective diode by clipping its leads as close as possible to diode body.
2. Bend the two remaining leads perpendicular y to the circuit board.
3. Observing diode polarity, wrap each lead of the new diode around the corresponding lead on the circuit board.
4. Securely crimp each connection and solder it.
5. Inspect (on the circuit board copper side) the solder joints of the two "original" leads. If they are not shiny, reheat them and if necessary, apply additional solder.

#### Fuse and Conventional Resistor

##### Removal/Replacement

1. Clip each fuse or resistor lead at top of the circuit board hollow stake.
2. Securely crimp the leads of replacement component around notch at stake top.

3. Solder the connections.

**CAUTION:** Maintain original spacing between the replaced component and adjacent components and the circuit board to prevent excessive component temperatures.

### Circuit Board Foil Repair

Excessive heat applied to the copper foil of any printed circuit board will weaken the adhesive that bonds the foil to the circuit board causing the foil to separate from or "lift-off" the board. The following guidelines and procedures should be followed whenever this condition is encountered.

#### At IC Connections

To repair a defective copper pattern at IC connections use the following procedure to install a jumper wire on the copper pattern side of the circuit board. (Use this technique only on IC connections).

1. Carefully remove the damaged copper pattern with a sharp knife. (Remove only as much copper as absolutely necessary).
2. Carefully scratch away the solder resist and acrylic coating (if used) from the end of the remaining copper pattern.
3. Bend a small "U" in one end of a small gauge jumper wire and carefully crimp it around the IC pin. Solder the IC connection.
4. Route the jumper wire along the path of the out-away copper pattern and let it overlap the previously scraped end of the good copper pattern. Solder the overlapped area and clip off any excess jumper wire.

#### At Other Connections

Use the following technique to repair the defective copper pattern at connections other than IC Pins. This technique involves the installation of a jumper wire on the component side of the circuit board.

1. Remove the defective copper pattern with a sharp knife. Remove at least 1/4 inch of copper, to ensure that a hazardous condition will not exist if the jumper wire opens.
2. Trace along the copper pattern from both sides of the pattern break and locate the nearest component that is directly connected to the affected copper pattern.
3. Connect insulated 20-gauge jumper wire from the lead of the nearest component on one side of the pattern break to the lead of the nearest component on the other side. Carefully crimp and solder the connections.

**CAUTION:** Be sure the insulated jumper wire is dressed so the it does not touch components or sharp edges.

# SPECIFICATION

NOTE : Specifications and others are subject to change without notice for improvement.

## 1. Application range

This specification is applied to the LED TV used LD3AF chassis.

## 2. Requirement for Test

Each part is tested as below without special appointment.

- 1) Temperature: 25 °C ± 5 °C(77 °F ± 9 °F), CST: 40 °C ± 5 °C
- 2) Relative Humidity: 65 % ± 10 %
- 3) Power Voltage  
: Standard input voltage (AC 100-240 V~, 50/60 Hz)  
\* Standard Voltage of each products is marked by models.
- 4) Specification and performance of each parts are followed each drawing and specification by part number in accordance with BOM.
- 5) The receiver must be operated for about 5 minutes prior to the adjustment.

## 3. Test method

- 1) Performance: LGE TV test method followed
- 2) Demanded other specification
  - Safety : CE, IEC specification
  - EMC : CE, IEC

## 4. Model General Specification

No.	Item	Specification	Remarks
1	Market	EU(PAL Market-37Countries)	<p><b>DTV &amp; Analog (Total 37 countries)</b>  <b>DTV (MPEG2/4, DVB-T) :37 countries</b>            UK/Italy/Germany/France/Spain/Sweden/Finland/Netherlands/ Belgium/Luxemburg/Greece/Denmark/Czech/Austria/Hungary/Swiss/Croatia/Turkey/Norway/Slovenia/Poland/Ukraine/Portugal/Ireland/Morocco/Latvia/Estonia/Lithania/Rumania/Bulgaria/Russia/Slovakia/Bosnia/Serbia/Albania/Kazakhstan/Belarus</p> <p><b>DTV (MPEG2/4, DVB-T2): 8 countries</b>            UK/Denmark/Sweden/Finland/Norway/Ireland/Ukraine/Kazakhstan</p> <p><b>DTV (MPEG2/4, DVB-C): 37 countries</b>            UK/Italy/Germany/France/Spain/Sweden/Finland/Netherlands/ Belgium/Luxemburg/Greece/Denmark/Czech/Austria/Hungary/Swiss/Croatia/Turkey/Norway/Slovenia/Poland/Ukraine/Portugal/Ireland/Morocco/Latvia/Estonia/Lithania/Rumania/Bulgaria/Russia/Slovakia/Bosnia/Serbia/Albania/Kazakhstan/Belarus</p> <p><b>DTV (MPEG2/4,DVB-S): 29 countries</b>            Italy/Germany/France/Spain/Netherlands/Belgium/Luxemburg/ Greece/Czech/Austria/Hungary/Swiss/Croatia/Turkey/Slovenia/Poland/Portugal/Morocco/Latvia/Estonia/Lithuania/Rumania/Bulgaria/Russia/Slovakia/Bosnia/Serbia/Albania/Belarus</p> <p><b>Supported satellite : 22 satellites</b>            HISPASAT 1C/1D, ATLANTIC BIRD 2, NILESAT 101/102, ATLANTIC BIRD 3, AMOS 2/3, THOR 5/6, IRIUS 4, EUTELSAT-W3A, EUROBIRD 9A, EUTELSAT-W2A, HOTBIRD 6/8/9, EUTELSAT-SESAT, ASTRA 1L/H/M/KR, ASTRA 3A/3B, BADR 4/6, ASTRA 2D, EUROBIRD 3, EUTELSAT-W7, HEL-LASSAT 2, EXPRESS AM1, TURKSAT 2A/3A, INTERSAT10</p>

No.	Item	Specification	Remarks
2	Broadcasting system	Analogue TV 1) PAL-BG 2) PAL-DK 3) PAL-I/I' 4) SECAM L/L' Digital TV 1) DVB-T/C/T2 Satellite Digital TV 1) DVB-T/C/S/S2	Analogue TV : (RF) VHF: E2 to E12, UHF : E21 to E69 (CATV) S1 to S20, HYPER: S21 to S47  Digital TV : VHF, UHF  Satellite TV : VHF, UHF, C-Band, Ku-Band  * DVB-T2 ( T2 model only support ) * DVB-S/S2 (Satellite model only support )
3	Receiving system	Analog : Upper Heterodyne Digital : COFDM , QAM	<p>► DVB-T</p> <ul style="list-style-type: none"> <li>- Guard Interval (Bitrate_Mbit/s) 1/4, 1/8, 1/16, 1/32</li> <li>- Modulation : Code Rate QPSK : 1/2, 2/3, 3/4, 5/6, 7/8 16-QAM : 1/2, 2/3, 3/4, 5/6, 7/8 64-QAM : 1/2, 2/3, 3/4, 5/6, 7/8</li> </ul> <p>► DVB-T2</p> <ul style="list-style-type: none"> <li>- Guard Interval (Bitrate_Mbit/s) 1/4, 1/8, 1/16, 1/32, 1/128, 19/128, 19/256,</li> <li>- Modulation : Code Rate QPSK : 1/2, 2/5, 2/3, 3/4, 5/6 16-QAM : 1/2, 2/5, 2/3, 3/4, 5/6 64-QAM : 1/2, 2/5, 2/3, 3/4, 5/6 256-QAM : 1/2, 2/5, 2/3, 3/4, 5/6</li> </ul> <p>► DVB-C</p> <ul style="list-style-type: none"> <li>- Symbolrate : 4.0Msymbols/s to 7.2Msymbols/s</li> <li>- Modulation : 16QAM, 64-QAM, 128-QAM and 256-QAM</li> </ul> <p>► DVB-S</p> <ul style="list-style-type: none"> <li>- symbol rate DVB-S2 (8PSK / QPSK) : 2 ~ 45Msymbol/s DVB-S (QPSK) : 2 ~ 45Msymbol/s</li> <li>- viterbi DVB-S mode : 1/2, 2/3, 3/4, 5/6, 7/8 DVB-S2 mode : 1/2, 2/3, 3/4, 3/5, 4/5, 5/6, 8/9, 9/10</li> </ul>
4	Scart Jack (1EA)	PAL, SECAM	Scart 1 Jack is Full scart and support RF-OUT(analog).
5	Component Input (1EA)	Y/Cb/Cr Y/Pb/Pr	Phone Jack type Video only(Rear)
6	RGB Input	RGB-PC	Analog(D-SUB 15PIN) *LN549E-ZA model only support
7	HDMI Input (3EA)	HDMI1-DTV/DVI HDMI2-DTV HDMI3-DTV	PC(HDMI version 1.3) Support HDCP The number of Input ports is different by model.
8	Audio Input (1EA)	RGB/DVI/Component Audio	RGB/DVI & Component Audio common port * Component/DVI Audio (LP63xH-ZA model support) * Component/RGB/DVI Audio (LN549E-ZA model support)
9	SDPIF out (1EA)	SPDIF out	
10	External Speaker out (1EA)	Stereo, 1W (8 Ω), Single-End	3P Phone Jack type
11	External Speaker out Control (1EA)	Phone Jack	3P Phone Jack type
12	Earphone out (1EA)	Antenna, AV1, AV2, Component, RGB, HDMI1, HDMI2, HDMI3	
13	USB	EMF, DivX HD, For SVC (download)	JPEG, MP3, DivX HD * 1EA (LP63xH-ZA model support ) * 2EA (LN549E-ZA model support )- USB IN, Wireless Dongle : Wireless Dongle port only use for Wireless
14	DVB	DVB-T  DVB-C	CI : UK, Finland, Denmark, Norway, Sweden, Russia, Spain, Ireland, Luxembourg, Belgium, Netherland CI+ : France(Canal+), Italy(DGTVi)  CI : Switzerland, Austria, Slovenia, Hungary, Bulgaria CI+ : Switzerland(UPC,Cablecom), Netherland(Ziggo), Germany(KDG,CWB), Finland(labwise)
15	RS232C(1EA)	Interactive mode support	
16	Ethernet (1EA)		Support only communication with Pro :Centrc Server Support only LP63xH-ZA model

## 5. Supported video resolutions (2D)

### 5.1. Component Input (Y, C<sub>B</sub>/P<sub>B</sub>, C<sub>R</sub>/P<sub>R</sub>)

No.	Resolution	H-freq(kHz)	V-freq(Hz)	Pixel clock(MHz)	Proposed
1	720*576	15.625	50.00	13.5	SDTV ,DVD 576I
2	720*480	15.73	60.00	13.5135	SDTV ,DVD 480I
3	720*480	15.73	59.94	13.50	SDTV ,DVD 480I
4	720*576	31.25	50.00	27.00	SDTV 576P
5	720*480	31.50	60.00	27.027	SDTV 480P
6	720*480	31.47	59.94	27.00	SDTV 480P
7	1280*720	37.50	50.00	74.25	HDTV 720P
8	1280*720	45.00	60.00	74.25	HDTV 720P
9	1280*720	44.96	59.94	74.176	HDTV 720P
10	1920*1080	28.125	50.00	74.25	HDTV 1080I
11	1920*1080	33.75	60.00	74.25	HDTV 1080I
12	1920*1080	33.72	59.94	74.176	HDTV 1080I
13	1920*1080	56.25	50.00	148.50	HDTV 1080P
14	1920*1080	67.50	60.00	148.50	HDTV 1080P
15	1920*1080	67.432	59.94	148.352	HDTV 1080P
16	1920*1080	27.00	24.00	74.25	HDTV 1080P
17	1920*1080	26.97	23.94	74.176	HDTV 1080P
18	1920*1080	33.75	30.00	74.25	HDTV 1080P
19	1920*1080	33.71	29.97	74.176	HDTV 1080P

### 5.2. RGB Input (PC) - HD Model

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	DDC
1.		640*480	31.469	59.94	VESA(VGA)	O
2.		800*600	37.879	60.31	VESA(SVGA)	O
3.		1024*768	48.363	60.00	VESA(XGA)	O
4.		1152*864	54.348	60.053	VESA	O

### 5.3. RGB Input (PC) - FHD Model

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	DDC
1	640*350	31.468	70.09	25.17	EGA	X
2	720*400	31.469	70.08	28.32	DOS	O
3	640*480	31.469	59.94	25.17	VESA(VGA)	O
4	800*600	37.879	60.31	40.00	VESA(SVGA)	O
5	1024*768	48.363	60.00	65.00	VESA(XGA)	O
6	1152*864	54.348	60.053	80.00	VESA	O
7	1360*768	47.712	60.015	85.50	VESA (WXGA)	O
8	1920*1080	66.587	59.934	138.5	HDTV 1080P	O



### 5.3. HDMI Input(PC/DTV)

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed		Remark
<b>PC(DVI)</b>					DDC		
1	640*350	31.468	70.09	25.17	EGA	X	
2	720*400	31.469	70.08	28.32	DOS	O	
3	640*480	31.469	59.94	25.17	VESA(VGA)	O	
4	800*600	37.879	60.31	40.00	VESA(SVGA)	O	
5	1024*768	48.363	60.00	65.00	VESA(XGA)	O	
6	1152*864	54.348	60.053	80.00	VESA	O	
7	1360*768	47.712	60.015	85.50	VESA (WXGA)	O	
8	1280*1024	63.981	60.020	108.0	VESA (SXGA)	O	
9	1920*1080	67.50	60.00	148.5	HDTV 1080P	O	
<b>DTV</b>							
1	720*480	31.47	59.94	27.00	SDTV 480P		
2	720*480	31.50	60.00	27.027	SDTV 480P		
3	720*576	31.250	50.00	27.00	SDTV 576P		
4	1280*720	37.50	50.00	74.25	HDTV 720P		
5	1280*720	45.00	60.00	74.25	HDTV 720P		
6	1280*720	44.96	59.94	74.176	HDTV 720P		
7	1920*1080	28.125	50.00	74.25	HDTV 1080I		
8	1920*1080	33.75	60.00	74.25	HDTV 1080I		
9	1920*1080	33.72	59.94	74.176	HDTV 1080I		
10	1920*1080	56.250	50.00	148.50	HDTV 1080P		
11	1920*1080	67.50	60.00	148.50	HDTV 1080P		
12	1920*1080	67.432	59.94	148.352	HDTV 1080P		
13	1920*1080	27.00	24.00	74.25	HDTV 1080P		
14	1920*1080	26.97	23.976	74.176	HDTV 1080P		
15	1920*1080	33.75	30.00	74.25	HDTV 1080P		

# ADJUSTMENT INSTRUCTION

## 1. Application Range

This specification sheet is applied to all of the LED TV with LD3AF chassis.

## 2. Designation

- (1) The adjustment is according to the order which is designated and which must be followed, according to the plan which can be changed only on agreeing.
- (2) Power adjustment : Free Voltage.
- (3) Magnetic Field Condition: Nil.
- (4) Input signal Unit: Product Specification Standard.
- (5) Reserve after operation : Above 5 Minutes (Heat Run)  
Temperature : at 25 °C ± 5 °C  
Relative humidity : 65 ± 10 %  
Input voltage : 220 V, 60 Hz
- (6) Adjustment equipments: Color Analyzer(CA-210 or CA-110), DDC Adjustment Jig, Service remote control.
- (7) Push the "IN STOP" key - For memory initialization.

Case1 : Software version up

1. After downloading S/W by USB , TV set will reboot automatically.
2. Push "In-stop" key.
3. Push "Power on" key.
4. Function inspection
5. After function inspection, Push "In-stop" key.

Case2 : Function check at the assembly line

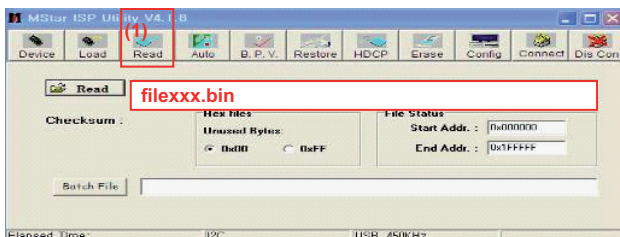
1. When TV set is entering on the assembly line, Push "In-stop" key at first.
2. Push "Power on" key for turning it on.  
→ If you push "Power on" key, TV set will recover channel information by itself.
3. After function inspection, Push "In-stop" key.

## 3. Main PCB check process

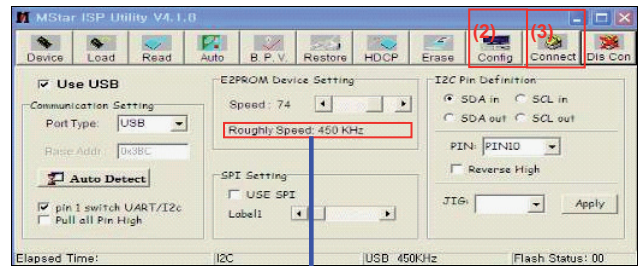
- APC - After Manual-Insert, executing APC

### \* Boot file Download

- (1) Execute ISP program "Mstar ISP Utility" and then click "Config" tab.
- (2) Set as below, and then click "Auto Detect" and check "OK" message.  
If "Error" is displayed, check connection between computer, jig, and set.
- (3) Click "Read" tab, and then load download file(XXXX.bin) by clicking "Read"

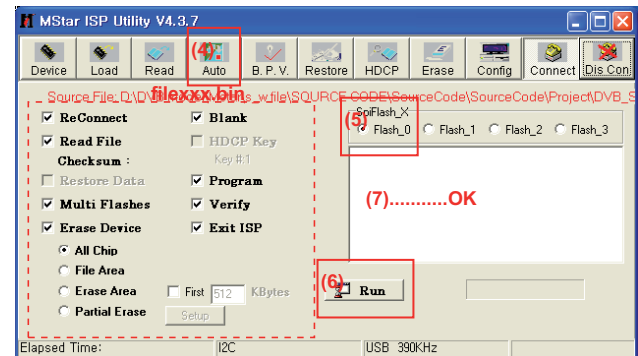


- (4) Click "Connect" tab. If "Can't" is displayed, check connection between computer, jig, and set.



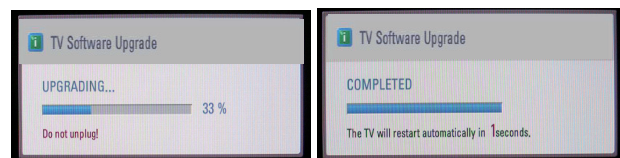
Please Check the Speed :  
To use speed between  
from 200KHz to 400KHz

- (5) Click "Auto" tab and set as below.
- (6) Click "Run".
- (7) After downloading, check "OK" message.



### \* USB DOWNLOAD

- (1) Put the USB Stick to the USB socket.
- (2) Automatically detecting update file in USB Stick.  
- If your downloaded program version in USB Stick is Low, it didn't work. But your downloaded version is High, USB data is automatically detecting.
- (3) Show the message "Copying files from memory".
- (4) Updating is starting.



- (5) Updating Completed, The TV will restart automatically.
  - (6) If your TV is turned on, check your updated version and Tool option. (explain the Tool option, next stage)
- \* If downloading version is more high than your TV have, TV can lost all channel data. In this case, you have to channel recover. if all channel data is cleared, you didn't have a DTV/ATV test on production line.

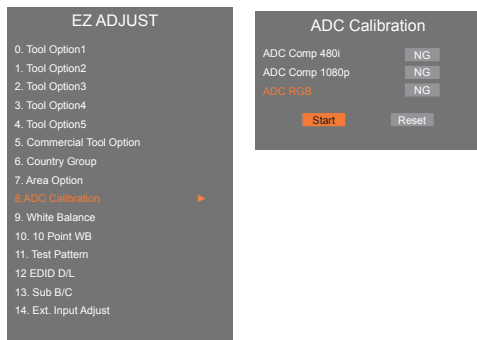
### \* After downloading, have to adjust Tool Option again.

- (1) Push "IN-START" key in service remote control.
- (2) Select "Tool Option 1" and push "OK" key.
- (3) Punch in the number. (Each model has their number)

### 3.1. ADC Process

#### (1) ADC

- Enter Service Mode by pushing "ADJ" key,
- Enter Internal ADC mode by pushing "▶" key at "8. ADC Calibration".



<Caution> Using "P-ONLY" key of the Adjustment remote control, power on TV.

If there is no Component Input, disappear "ADC Comp" message.

\* ADC Calibration Protocol (RS232)

#### Adjust Sequence

NO	Item	CMD 1	CMD 2	Data 0	
Enter Adjust MODE	Adjust 'Mode In'	A	A	0 0	When transfer the 'Mode In', Carry the command.
ADC adjust	ADC Adjust	A	D	1 0	Automatically adjustment (The use of a internal pattern)

- aa 00 00 [Enter Adjust Mode]
- xb 00 40 [Component1 Input (480i)]
- ad 00 10 [Adjust 480i Comp1]
- xb 00 60 [RGB Input (1024\*768)]
- ad 00 10 [Adjust 1024\*768 RGB]
- aa 00 90 End Adjust mode

\* Required equipment : Adjustment remote control.

### 3.2. Function Check

#### 3.2.1. Check display and sound

- Check Input and Signal items. (cf. work instructions)

1. TV
2. AV
3. COMPONENT (480i)
4. RGB (PC : 1024 x 768 @ 60hz)
5. HDMI
6. PC Audio In

\* Display and Sound check is executed by Remote controller

Caution : Not to push the INSTOP KEY after completion if the function inspection.

### 4. Total Assembly line process

#### 4.1. Adjustment Preparation

- W/B Equipment condition  
ca210 : LED -> CH14, Test signal: Inner pattern(80IRE)
- Above 5 minutes H/run in the inner pattern. ("power on" key of adjust remote control)
- If it is executed W/B adjustment in 2~3 minutes H/run, it is adjusted by Target data

Mode	Temp	Coordinate spec	
Cool	13,000 k	X=0.269 (±0.002) Y=0.273 (±0.002)	<Test Signal> Inner pattern (204gray, 80IRE)
Medium	9,300 k	X=0.285 (±0.002) Y=0.293 (±0.002)	
Warm	6,500 k	X=0.313 (±0.002) Y=0.329 (±0.002)	

▪ Normal line

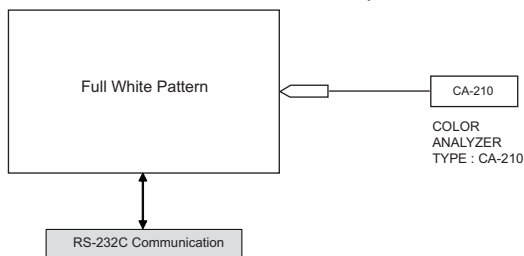
	Aging time (Min)	Cool		Medium		Warm	
		X	y	x	y	x	y
		271	270	285	293	313	329
1	0-2	281	287	295	310	320	342
2	3-5	280	285	294	308	319	340
3	6-9	278	284	292	307	317	339
4	10-19	276	281	290	304	315	336
5	20-35	275	277	289	300	314	332
6	36-49	274	274	288	297	313	329
7	50-79	273	272	287	295	312	327
8	80-119	272	271	286	294	311	326
9	Over 120	271	270	285	293	310	325

▪ Aging chamber

	Aging time (Min)	Cool		Medium		Warm	
		271	270	285	293	313	329
		280	285	294	308	319	340
1	0-5	276	280	290	303	315	335
2	6-10	272	275	286	298	311	330
3	11-20	269	272	283	295	308	327
4	21-30	267	268	281	291	306	323
5	31-40	266	265	280	288	305	320
6	41-50	265	263	279	286	304	318
7	51-80	264	261	278	284	303	316
8	81-119	264	260	278	283	303	315
9	Over 120	271	270	285	293	310	325

\* Connecting picture of the measuring instrument (On Automatic control)

Inside PATTERN is used when W/B is controlled. Connect to auto controller or push Adjustment R/C POWER ON → Enter the mode of White-Balance, the pattern will come out.



### \* Auto-control interface and directions

- (1) Adjust in the place where the influx of light like floodlight around is blocked. (illumination is less than 10 lux).
- (2) Adhere closely the Color analyzer(CA210) to the module less than 10 cm distance, keep it with the surface of the Module and Color analyzer's probe vertically.(80° ~ 100°).
- (3) Aging time
  - After aging start, keep the power on (no suspension of power supply) and heat-run over 5 minutes.
  - Using 'no signal' or 'POWER ONLY' or the others, check the back light on.

### ▪ Auto adjustment Map(RS-232C)

#### RS-232C COMMAND

#### [CMD ID DATA]

Wb 00 00 White Balance Start  
Wb 00 ff White Balance End

	RS-232C COMMAND [CMD ID DATA]			MIN	CENTER (DEFAULT)			MAX
	Cool	Mid	Warm		Cool	Mid	Warm	
R Gain	jg	Ja	jd	00	172	192	192	192
G Gain	jh	Jb	je	00	172	192	192	192
B Gain	ji	Jc	jf	00	192	192	172	192
R Cut					64	64	64	128
G Cut					64	64	64	128
B Cut					64	64	64	128

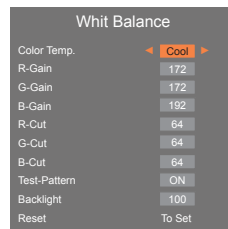
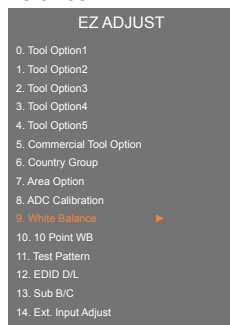
#### <Caution>

Color Temperature : COOL, Medium, Warm.

One of R Gain/G Gain/ B Gain should be kept on 0xC0, and adjust other two lower than C0.(When R/G/B Gain are all C0, it is the FULL Dynamic Range of Module)

### \* Manual W/B process using adjust Remote control.

- After enter Service Mode by pushing "ADJ" key,
- Enter White Balance by pushing "►" key at "8. White Balance".



- \* After you finished all adjustments, Press "In-start" key and compare Tool option and Area option value with its BOM, if it is correctly same then unplug the AC cable. If it is not same, then correct it same with BOM and unplug AC cable. For correct it to the model's module from factory Jig model.
- \* Push the "IN STOP" key after completing the function inspection. And Mechanical Power Switch must be set "ON".

## 4.2. DPM operation confirmation (Only Apply for MNT Model)

Check if Power LED Color and Power Consumption operate as standard.

- Set Input to RGB and connect D-sub cable to set
- Measurement Condition: (AC 100-240V~, 50/60 Hz)
- Confirm DPM operation at the state of screen without Signal

## 4.3. DDC EDID Write (RGB 128Byte )

- Connect D-sub Signal Cable to D-Sub Jack.
- Write EDID DATA to EEPROM (24C02) by using DDC2B protocol.
- Check whether written EDID data is correct or not.

\* For Service main Assembly, EDID have to be downloaded to Insert Process in advance.

## 4.4. DDC EDID Write (HDMI 256Byte)

- Connect HDMI Signal Cable to HDMI Jack.
- Write EDID DATA to EEPROM(24C02) by using DDC2B protocol.
- Check whether written EDID data is correct or not.

\* For Service main Assembly, EDID have to be downloaded to Insert Process in advance.

## 4.5. EDID data

(1) All Data : HEXA Value

(2) Changeable Data :

\*: Serial No : Controlled / Data:01

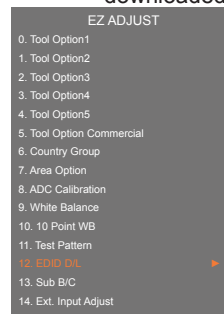
\*\*: Month : Controlled / Data:00

\*\*\*:Year : Controlled

\*\*\*\*:Check sum

### 4.5.1. Auto Download

- After enter Service Mode by pushing "ADJ" key,
- Enter EDID D/L mode.
- Enter "START" by pushing "OK" key.
- \* Caution : Never connect HDMI & D-sub Cable when EDID downloaded.





### \* EDID data and Model option download (RS232)

NO	Item	CMD 1	CMD 2	Data 0	
Enter download MODE	Download 'Mode In'	A	A	0 0	When transfer the 'Mode In', Carry the command.
EDID data and Model option download	Download	A	E	00 10	Automatically download (The use of a internal data)

## 4.5.2. Manual Download

<Caution>

- (1) Use the proper signal cable for EDID Download
  - Analog EDID : Pin3 exists
  - Digital EDID : Pin3 exists
- (2) Never connect HDMI & D-sub Cable at the same time.
- (3) Use the proper cables below for EDID Writing.
- (4) Download HDMI1, HDMI2 separately because HDMI1 is different from HDMI2.

For Analog		For HDMI EDID	
D-sub to D-sub		DVI-D to HDMI or HDMI to HDMI	
			
No.	Item	Condition	Hex Data
1	Manufacturer ID	GSM	1E6D
2	Version	Digital : 1	01
3	Revision	Digital : 3	03

### (1) FHD RGB EDID data

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	a		b			
10	c	01	03	68	A0	5A	78	0A	EE	91	A3	54	4C	99	26	
20	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	01	01
30	01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	A0	5A	00	00	00	1E	66	21	50	B0	51	00	1B	30
50	40	70	36	00	A0	5A	00	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	20	d			
70	d															e

### (2) FHD HDMI EDID data

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	a		b			
10	c	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26	
20	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	01	01
30	01	01	01	01	01	01	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	A0	5A	00	00	00	1E	66	21	50	B0	51	00	1B	30
50	40	70	36	00	A0	5A	00	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	20	d			
70	d															e
80	02	03	22	F1	4E	10	9F	04	13	05	14	03	02	12	20	21
90	22	15	01	26	15	07	50	09	57	07	f					
A0	f	01	1D	80	18	71	1C	16	20	58	2C	25	00	20	C2	
B0	31	00	00	9E	01	1D	00	72	51	D0	1E	20	6E	28	55	00
C0	20	C2	31	00	00	1E	02	3A	80	18	71	38	2D	40	58	2C
D0	45	00	A0	5A	00	00	00	1E	01	1D	00	BC	52	D0	1E	20
E0	B8	28	55	40	C4	8E	21	00	00	1E	00	00	00	00	00	00
F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	e

### (3) HD RGB EDID data

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	a		b			
10	c	01	03	68	A0	5A	78	0A	EE	91	A3	54	4C	99	26	
20	0F	50	54	A1	08	00	71	40	61	40	45	40	31	40	01	01
30	01	01	01	01	01	01	1B	21	50	A0	51	00	1E	30	48	88
40	35	00	40	84	FF	FF	00	1C	01	1D	00	72	51	D0	1E	20
50	6E	28	55	00	A0	5A	00	00	00	1E	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	20	d			
70	d															e

### (4) HD HDMI EDID data

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	a		b			
10	c	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C	99	26	
20	0F	50	54	A1	08	00	31	40	45	40	61	40	71	40	01	01
30	01	01	01	01	01	01	66	21	50	B0	51	00	1B	30	40	70
40	36	00	40	84	63	00	00	1E	64	19	00	40	41	00	26	30
50	18	88	03	06	40	84	63	00	00	18	00	00	00	FD	00	3A
60	3E	1E	53	10	00	0A	20	20	20	20	20	20	d			
70	d															e
80	02	03	22	F1	4E	10	1F	04	93	05	14	03	02	12	20	21
90	22	15	01	26	15	07	50	09	57	07	f					
A0	80	1E	01	1D	80	18	71	1C	16	20	58	2C	25	00	A0	5A
B0	00	00	00	9E	01	1D	00	72	51	D0	1E	20	6E	28	55	00
C0	20	C2	31	00	00	1E	8C	0A	D0	8A	20	E0	2D	10	10	3E
D0	96	00	A0	5A	00	00	00	18	02	3A	80	18	71	38	2D	40
E0	58	2C	45	00	A0	5A	00	00	00	1E	00	00	00	00	00	00
F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	e

### (5) Detail EDID Options are below

#### a. Product ID

MODEL NAME	HEX	EDID Table	DDC Function
HD/FHD Model	0001	01 00	Analog/Digital

#### b. Serial No: Controlled on production line.

#### c. Month, Year: Controlled on production line:

ex) Week : '01' -> '01'

Year : '2012' -> '16' fix

#### d. Model Name(Hex):

cf) TV set's model name in EDID data is below.

Model name	MODEL NAME(HEX)
LG TV	00 00 00 FC 00 4C 47 20 54 56 0A 20 20 20 20 20 20 (LG TV)

#### e. Checksum: Changeable by total EDID data.

EDID C/S data		FHD		HD	
		HDMI	RGB	HDMI	RGB
Check sum (Hex)	Block 0	43	5C	A4	A5
	Block 1	25 (HDMI1)	-	5B (HDMI1)	-
		15 (HDMI2)		4B (HDMI2)	
		5 (HDMI3)		3B (HDMI3)	

#### f. Vendor Specific(HDMI)

Input	MODEL NAME(HEX)	
	FHD	HD
HDMI1	67030C001000801E	67030C001000
HDMI2	67030C002000801E	67030C002000
HDMI3	67030C003000801E	67030C003000



## 4.6. Outgoing condition Configuration

- When pressing IN-STOP key by SVC remocon, Red LED are blinked alternatively. And then automatically turn off. (Must not AC power OFF during blinking)

## 4.7. HI-POT Test

### 4.7.1. HI-POT auto-check preparation

- Check the POWER cable and SIGNAL cable insertion condition

### 4.7.2. HI-POT auto-check

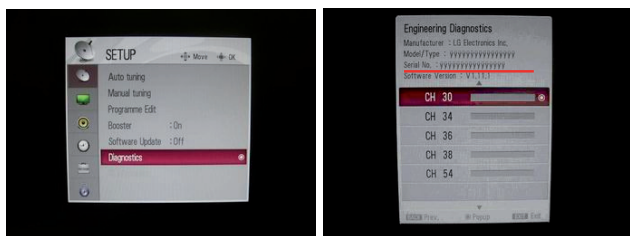
- Pallet moves in the station. (POWER CORD / AV CORD is tightly inserted)
- Connect the AV JACK Tester.
- Controller (GWS103-4) on.
- HI-POT test (Auto)
  - If Test is failed, Buzzer operates.
  - If Test is passed, GOOD Lamp on and move to next process automatically.

### 4.7.3. Checkpoint

- Test voltage
  - Touchable Metal : 3 KV / min at 100 mA
  - SIGNAL : 3 KV / min at 100 mA
- TEST time: 1 second. (case : mass production )
- TEST POINT
  - Touchable Metal => LIVE & NEUTRAL : Touchable Metal.
  - SIGNAL => LIVE & NEUTRAL : SIGNAL.

## 5. Model name & Serial number D/L

- Press "Power on" key of service remote control. (Baud rate : 115200 bps)
- Connect RS232 Signal Cable to RS-232 Jack.
- Write Serial number by use RS-232.
- Must check the serial number at the Diagnostics of SET UP menu. (Refer to below).



## 5.1. Signal Table

CMD	LENGTH	ADH	ADL	DATA_1	...	Data_n	CS	DELAY
-----	--------	-----	-----	--------	-----	--------	----	-------

CMD : A0h  
 LENGTH : 85~94h (1~16 bytes)  
 ADH : EEPROM Sub Address high (00~1F)  
 ADL : EEPROM Sub Address low (00~FF)  
 Data : Write data  
 CS : CMD + LENGTH + ADH + ADL + Data\_1 + ... + Data\_n  
 Delay : 20ms

## 5.2. Comand Set

Adjust mode	CMD(hex)	LENGTH(hex)	Description
EEPROM WRITE	A0h	84h+n	n-bytes Write (n = 1~16)

\* Description

FOS Default write : <7mode data> write

Vtotal, V\_Frequency, Sync\_Polarity, Htotal, Hstart, Vstart, 0, Phase

Data write : Model Name and Serial Number write in EEPROM.

## 5.3. Method & notice

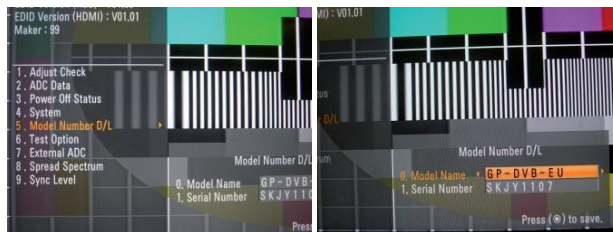
- Serial number D/L is using of scan equipment.
- Setting of scan equipment operated by Manufacturing Technology Group.
- Serial number D/L must be conformed when it is produced in production line, because serial number D/L is mandatory by D-book 4.0.

\* Manual Download(Model Name and Serial Number)

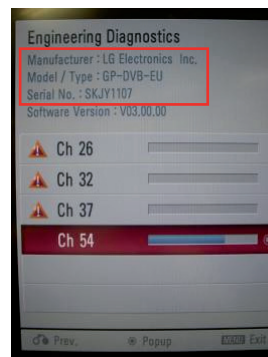
If the TV set is downloaded by OTA or Service man, sometimes model name or serial number is initialized.(Not always)

There is impossible to download by bar code scan, so It need Manual download.

- Press the "Instart" key of Adjustment remote control.
- Go to the menu "5.Model Number D/L" like below photo.
- Input the Factory model name or Serial number like photo.



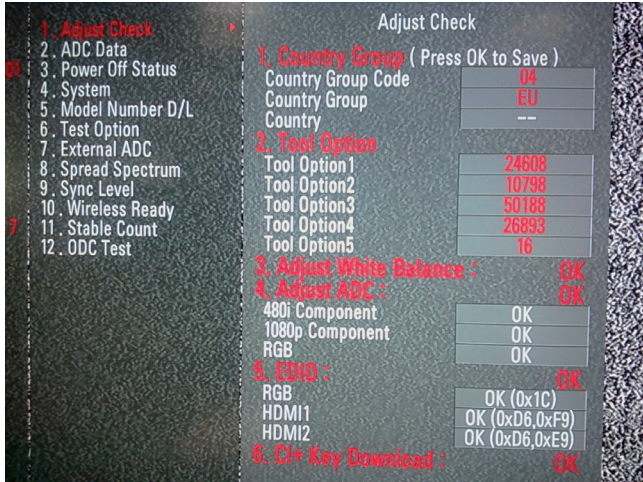
- Check the model name Instart menu. → Factory name displayed. (ex 42LD450-ZA)
- Check the Diagnostics.(DTV country only) → Buyer model displayed.(ex 42LD450)



## 6. CI+ Key Download method

### 6.1. Download Procedure

- Press "Power on" key of a service Remote control.  
(Baud rate : 115200 bps)
- Connect RS232-C Signal Cable.
- Write CI+ Key through RS-232-C.
- Check whether the key was downloaded or not at 'In Start' menu. (Refer to below).



=> Check the Download to CI+ Key value in LGset.

- Check the method of CI+ Key value
  - Check the method on Instart menu



- Check the method of RS232C Command

- Into the main ass'y mode (RS232 : aa 00 00)

CMD 1	CMD 2	Data 0
A	A	0 0

- Check the key download for transmitted command (RS232 : ci 00 10)

CMD 1	CMD 2	Data 0
C	I	1 0

- Result value

- Normally status for download : OKx
- Abnormally status for download : NGx

- Check the method of CI+ key value (RS232)

- Into the main ass'y mode (RS232 : aa 00 00)

CMD 1	CMD 2	Data 0
A	A	0 0

- Check the method of CI+ key by command (RS232 : ci 00 20)

CMD 1	CMD 2	Data 0
C	I	2 0

- result value

i 01 OK 1d1852d21c1ed5dcx

CI+ Key Value

## 8. Commercial Feature inspection

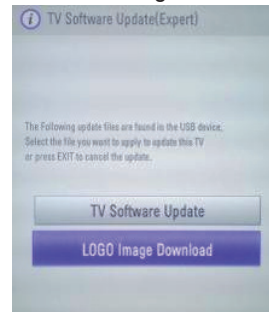
### 8.1. LG Logo inspection

- Turn on TV.
- Check LG Logo operation when TV is turning on. (Check LG Logo is displayed well or not.)

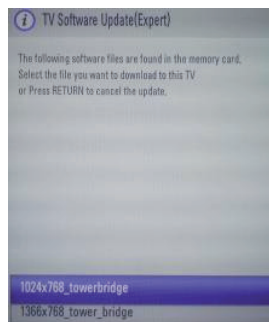
### 8.2 Welcome Screen Function check

(Image File must be in USB LG\_DTV folder)

- Press "IN STOP" key.
- Turn on TV.
- Insert USB.
- Press "MENU" key.
- Move cursor to OPTION and press "7" key 7 times.
- Move cursor to "LOGO Image Download" key and select it.



- Select image file.

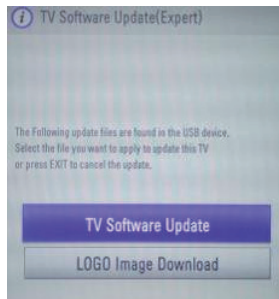


- (8) Check displayed image status(color, size) when TV is turning on.

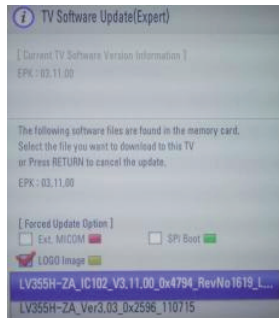


<Image for test- 720x576> Please use this image for test.

- (9) Try this inspection with various resolution images.  
 \* Must Restore to LG Logo.  
 (10) Press "MENU" key.  
 (11) Move cursor to OPTION and press "7" key 7 times.



- (12) Select accurate CPU S/W file and check "LOGO Image" button. (Press yellow color key on Remote Control.)



- (13) Check LG Logo operation when TV is turning on.

## 8.3. USB Cloning Function check

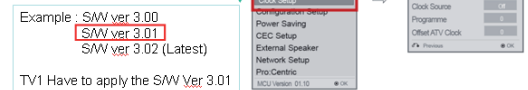
### • CASE 1. Clock LED Model



- TV 1 (TV1 Have to apply the one step before S/W than latest S/W Version)

- STEP 1. Press the MENU button for more than 5 seconds using the user remote control,  
 STEP 2. Before the Banner disappear at upper left on the screen, Enter a four digit password "1-1-0-5" and press Enter(OK) button

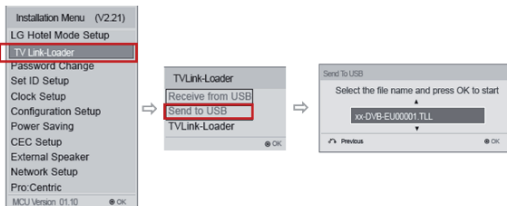
- STEP 3. Select the Clock Setup and press Enter(OK)  
 STEP 4. Select 'YES' by pressing <-> button



- STEP 5. Press the Menu button to access the main menus.  
 STEP 6. Select the SETUP Menu and press Enter(OK)  
 STEP 7. Select the Auto Tuning and press Enter(OK)  
 STEP 8. Press the Start button. If you finished channel tuning (if you could see DTV, ATV channels exist), move the next step



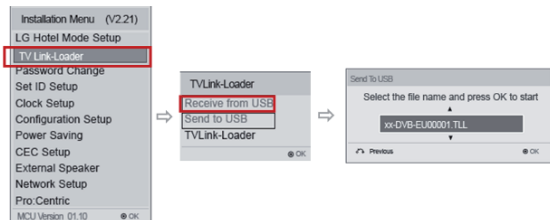
- STEP 9. Plug in USB memory card into the port of TV1.  
 STEP 10. Access the "Installation Menu" (Refer to Step 1 and 2) and Press the ^ v button to select the TV Link-Loader  
 STEP 11. Select the Send to USB and press OK  
 STEP 12. Select the file name and press OK to start (TV1 setting data is stored to USB card)



- TV 2 (TV2 have to apply the Latest S/W Version)

Example : SW ver 3.00  
 SW ver 3.01  
 SW ver 3.02 (Latest)  
 TV2 Have to apply the SW Ver 3.02

- STEP 1. Plug in USB memory card which is stored TV1 setting data, into the port of TV2  
 STEP 2. Access the Installation Menu and select the "TV Link-Loader" + Enter(OK)  
 STEP 3. Select the "Receive from USB " and press Enter(OK)  
 STEP 4. Select the file name and press OK to start



If the clock LED of TV 2 is on and TV 1, 2 had a same TV channels → USB cloning is success!!



## • CASE 2. No Clock LED Model

• TV 1 (TV1 Have to apply the one step before S/W than latest S/W Version)

STEP 1. Press Menu button to access the main menus.

STEP 2. Press the Navigation buttons to scroll to AUDIO and press Enter(OK)

STEP 3. Select 'On' of Auto volume



STEP 4. Press the Menu button to access the main menus.

STEP 5. Press the Navigation buttons to scroll to SETUP and press OK.

STEP 6. Select the Auto Tuning and press OK

STEP 7. Press the Start button. Auto tuning is finished, move the next step



if you can see DTV, ATV channels exist, move the next step!!!

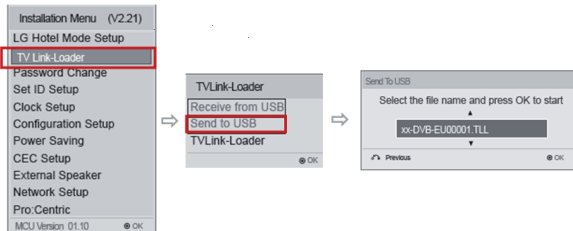
STEP 8. Plug in USB memory card into the port on target TV.

STEP 9. Access the Installation Menu (Refer to Step1, 2 of 2nd Page)

select the TV Link-Loader

STEP 10. Select the "Send to USB" and press Enter(OK)

STEP 11. Select the file name and press Enter(OK) to start



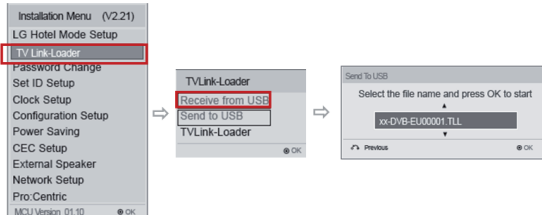
• TV 2 (TV2 have to apply the Latest S/W Version)

STEP 1. Plug in USB memory card which is stored TV1 setting data, into the port of TV2

STEP 2. Access the Installation Menu (refer to Step 1,2 of 2nd Page)  
and select the "TV Link-Loader"

STEP 3. Select the "Receive from USB" and press Enter(OK)

STEP 4. Select the file name and press Enter(OK) to start

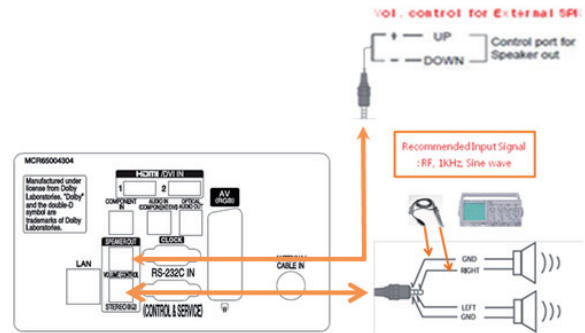


If the auto volume of TV 2 is on and TV 1, 2 had a same TV channels → USB cloning is success!!

## 8.4. Check Commercial features concerning Output.(IR Out/SPK Out/External Clock)

Model Info	Commercial Feature		
Name	IR Out	External Speaker out	External Clock
LP63xH-ZA	O	O	O
LN549E-ZA	O	O	X

### 8.4.1. External SPK Out and Volume control



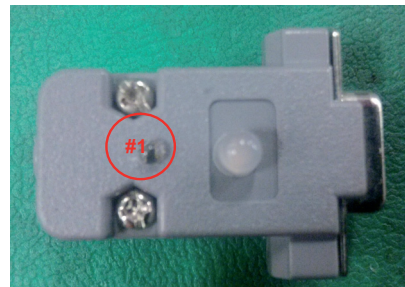
- (1) Connect external speaker to speaker out port with phone jack on TV side as below.
- (2) Check the Max. speaker output is 1W or not. Sine wave with 1KHz will be displayed.
- (3) Press Vol. control button up/down in turns and check the waveform of Oscilloscope

Button of Vol. control	Waveform of Oscilloscope	Recommended Input Signal : RF, 1kHz, Sine wave
UP(+)		
DOWN(-)		

### 8.4.2. IR Out

< Equipment & Condition >

- Simple Jig (commercial check JIG)
- Power only mode

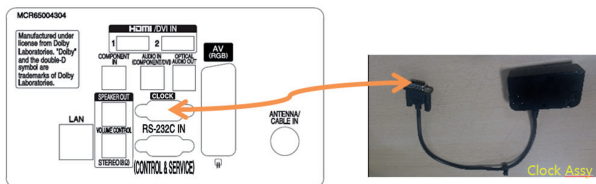


- (1) Connect each other RS232C port on the Commercial Check JIG.
- (2) Press any key on SVC Remote-control.
- (3) Check the LED status of the Check JIG.  
- IR LED(OK condition: blinking) (LED #1)

### 8.4.3. External Clock

< Equipment & Condition >



- Simple Jig (External Clock Assy)
- Power only mode



- (1) Connect external Clock Assy to CLOCK INTERFACE.
- (2) Check the LED CLOCK.



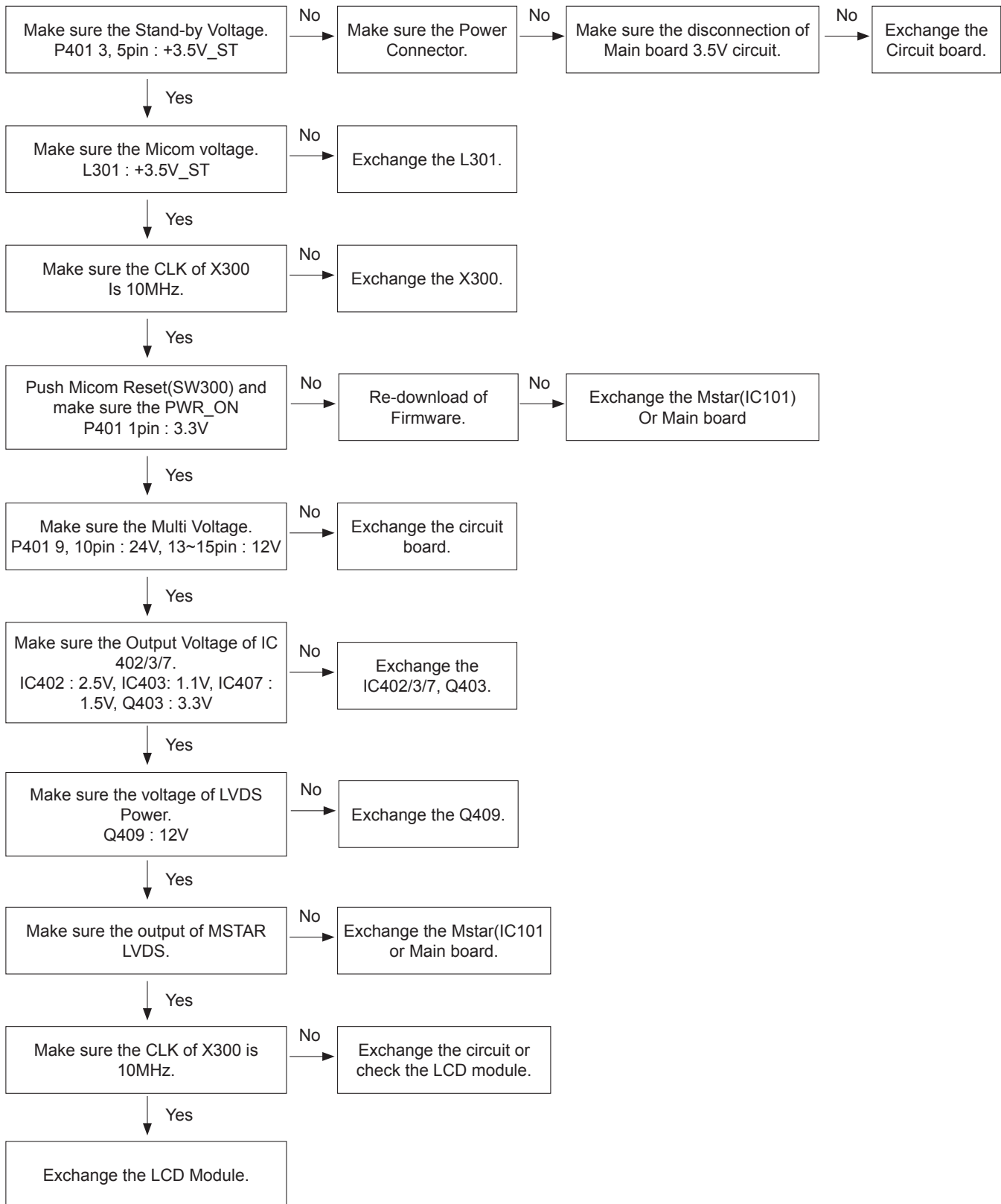
Check LED Clock in Power on mode.

NG	GOOD
 <p>The Number is not displayed normally.</p>	 <p>Check that be displayed the Number without spot of darkness.</p>

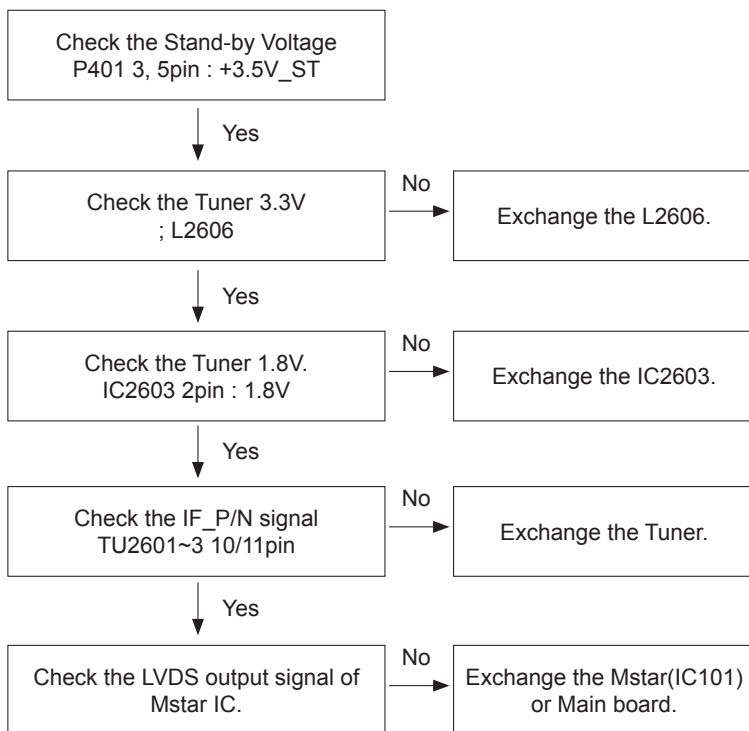
**\* After finishing 8.1 ~ 8.4 inspections, press “IN STOP” key.**

# TROUBLESHOOTING GUIDE

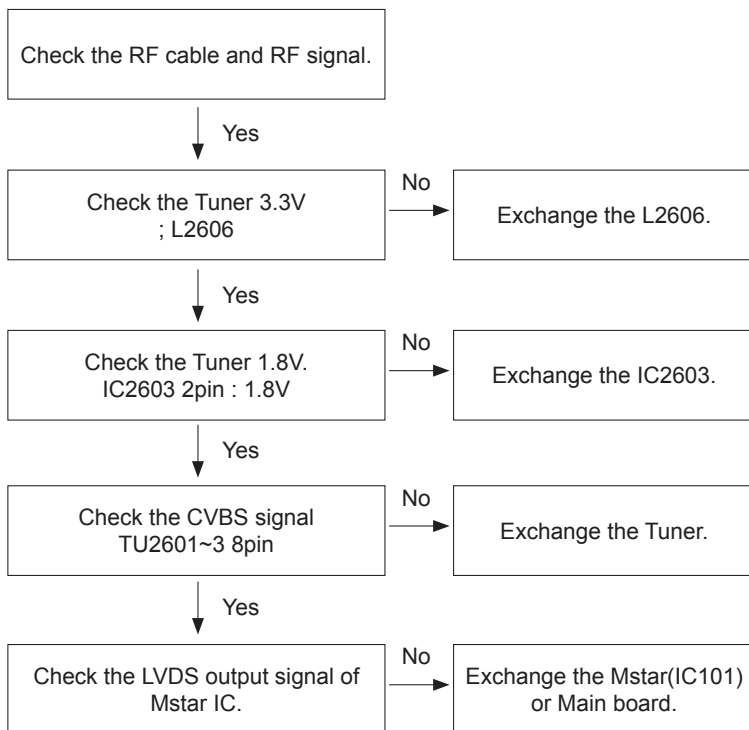
## 1. Check the booting Voltage



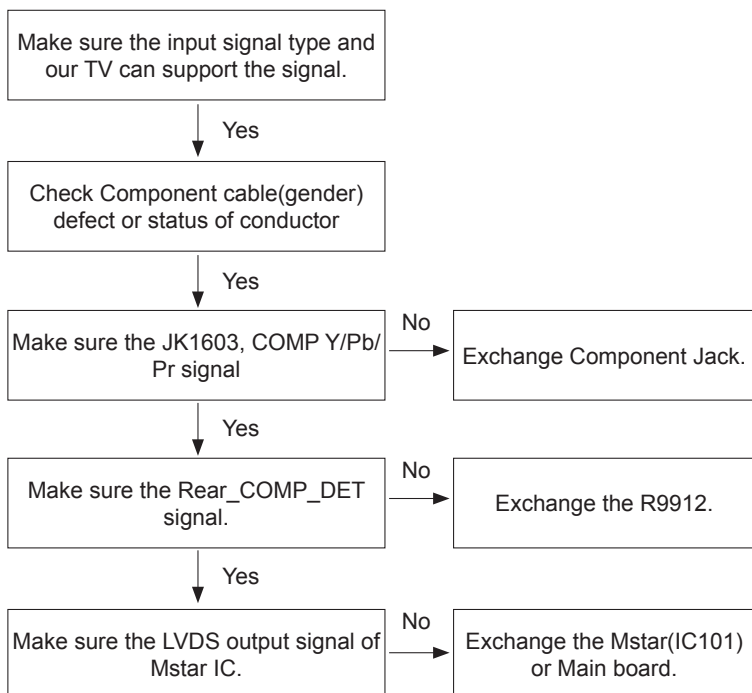
## 2. Digital TV Video



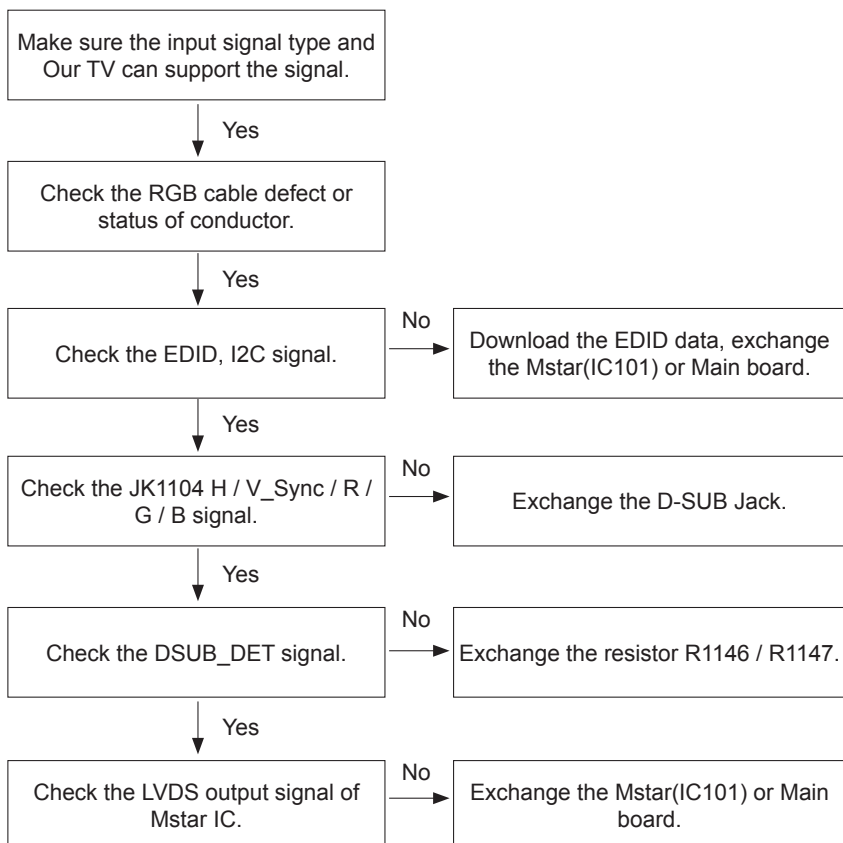
## 3. Analog TV Video



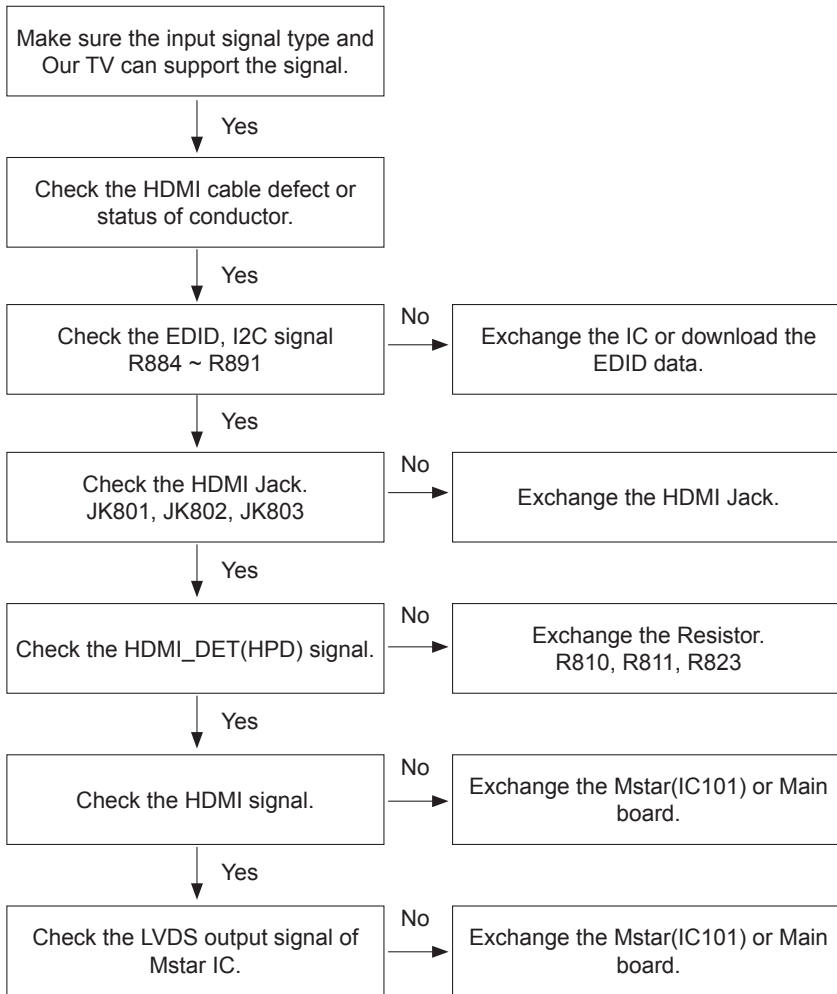
## 4. Component Video



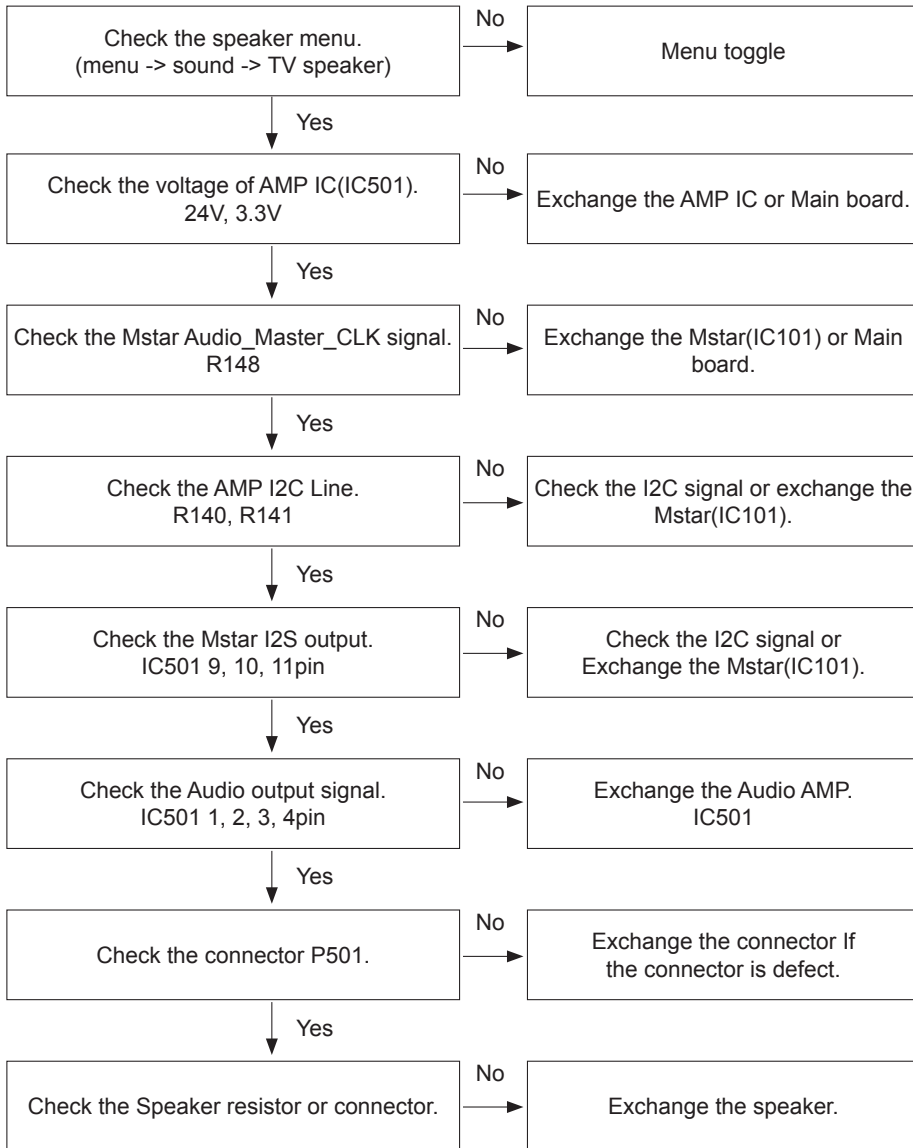
## 5. RGB Video (LN549E Only)



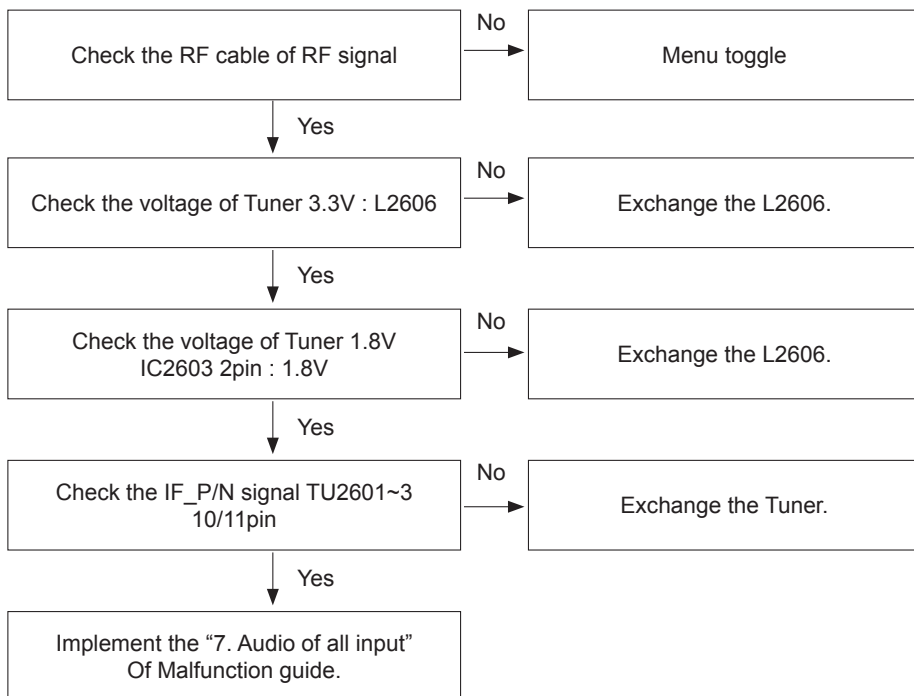
## 6. HDMI Video



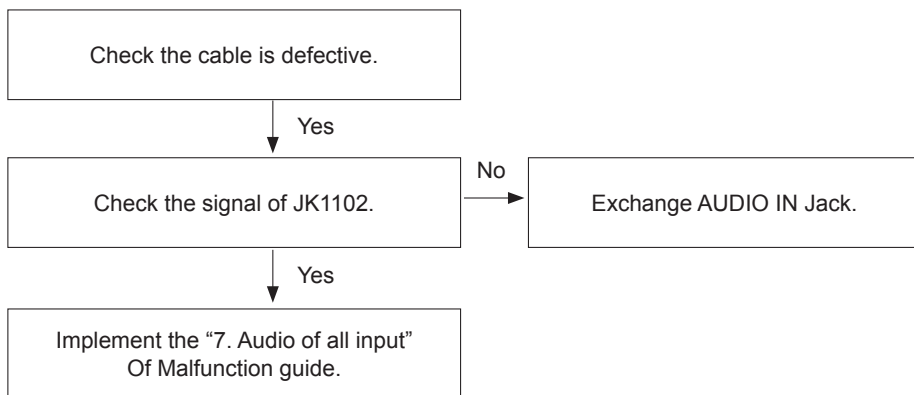
## 7. Audio of All input



## 8. TV Audio

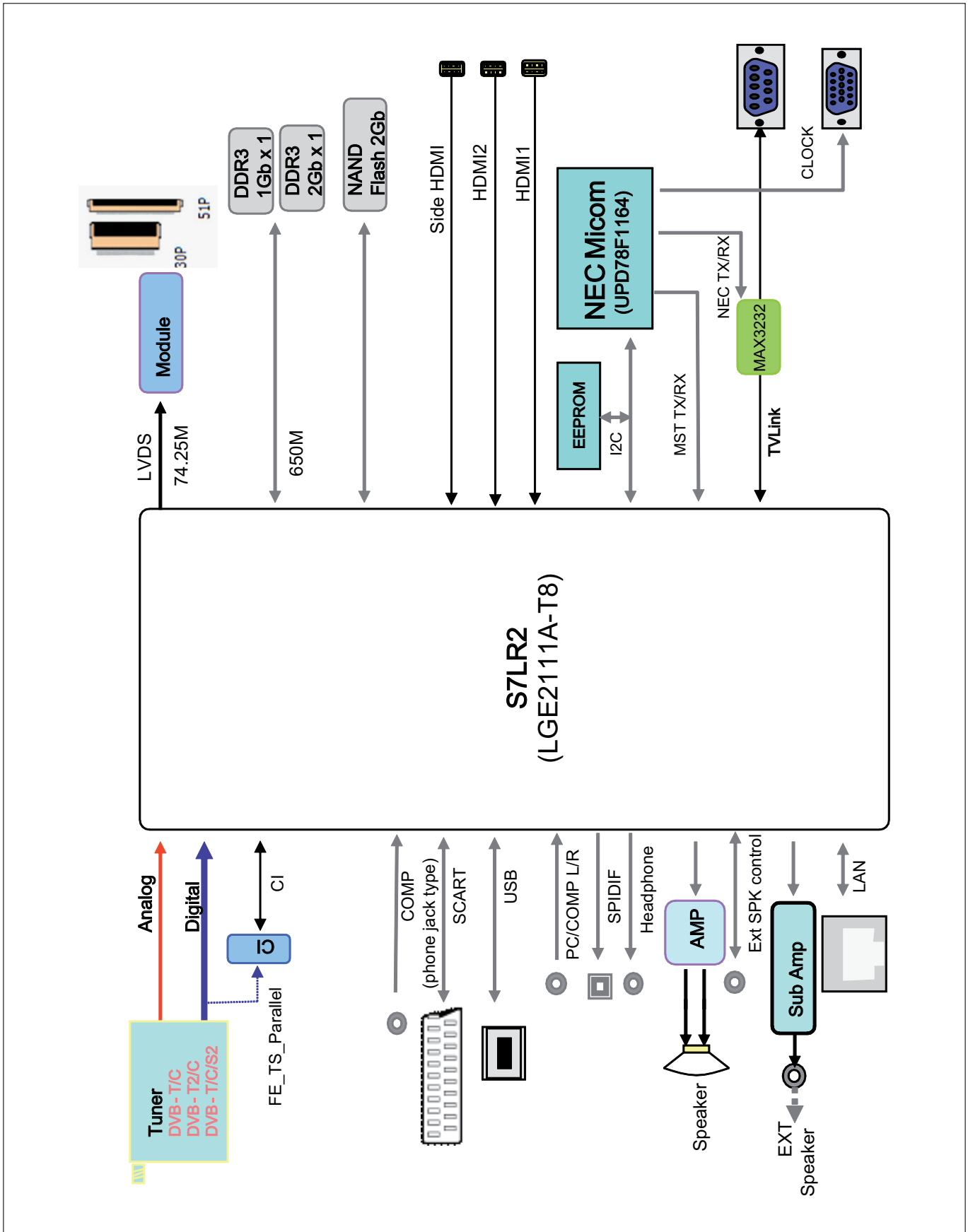


## 9. AUDIO IN (Component/DVI Audio) (PC Audio:LN549E Only)





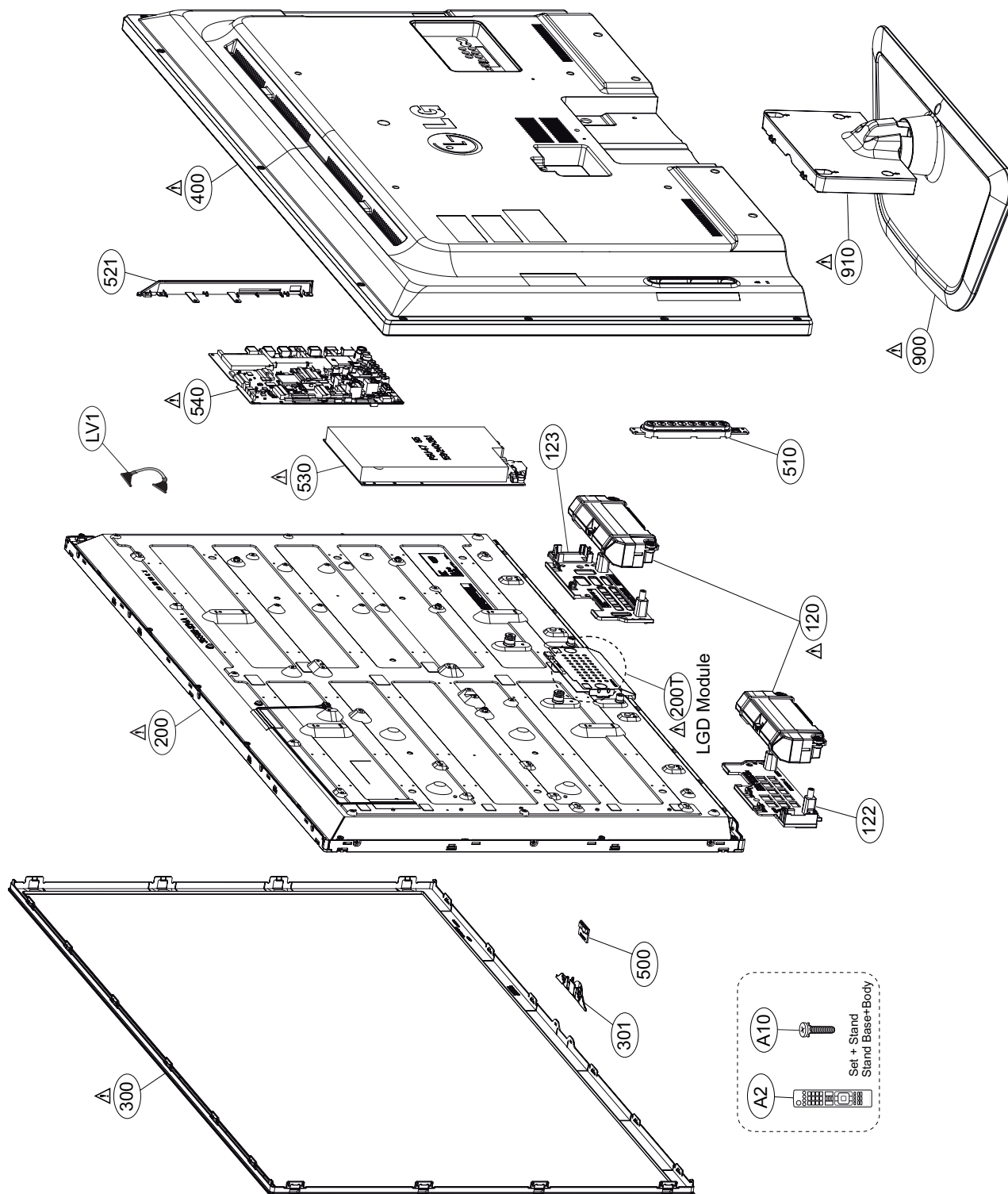
# BLOCK DIAGRAM



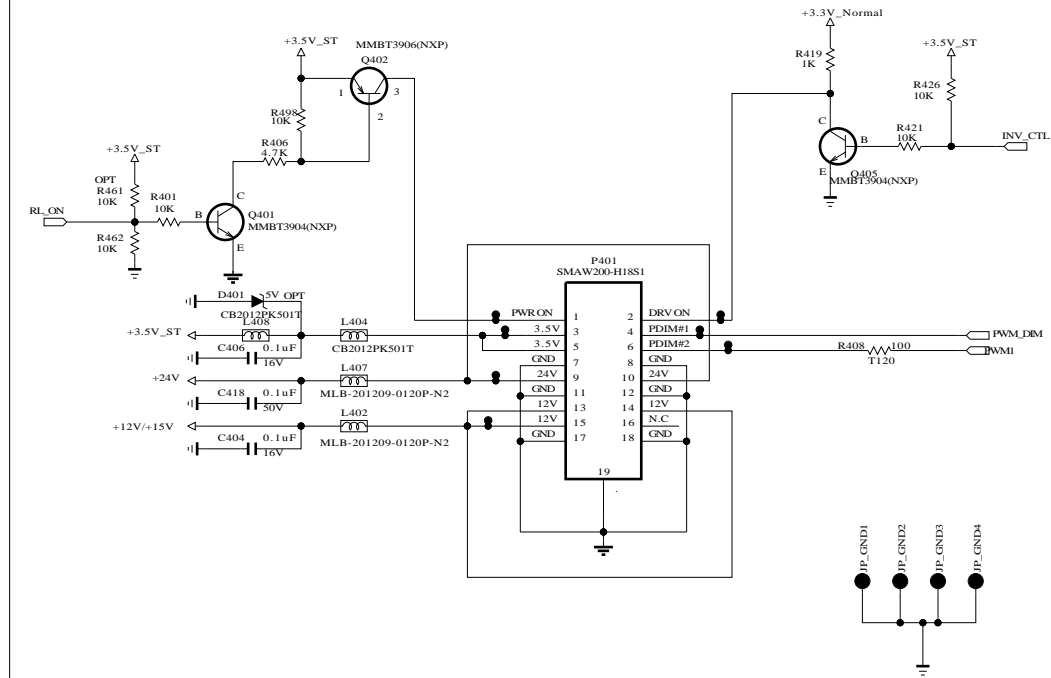
# EXPLODED VIEW

## IMPORTANT SAFETY NOTICE

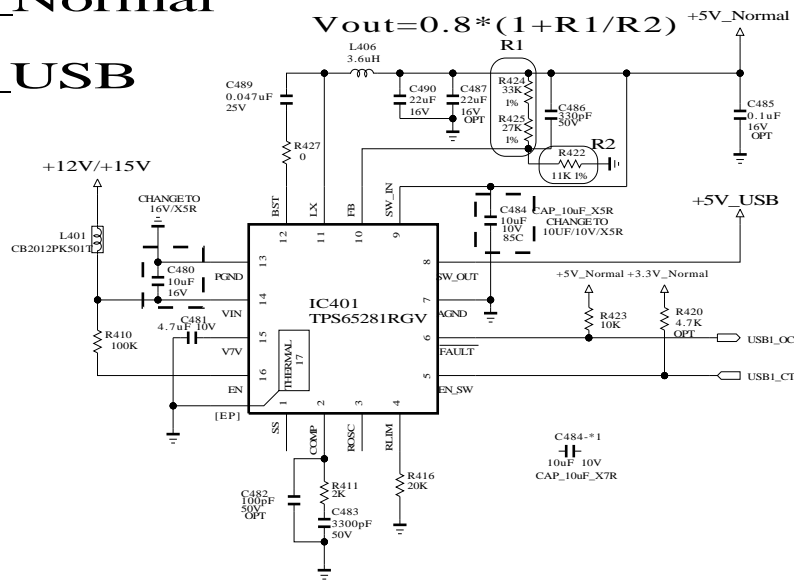
Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by  $\Delta$  in the Schematic Diagram and EXPLODED VIEW. It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent X-RADIATION, Shock, Fire, or other Hazards. Do not modify the original design without permission of manufacturer.



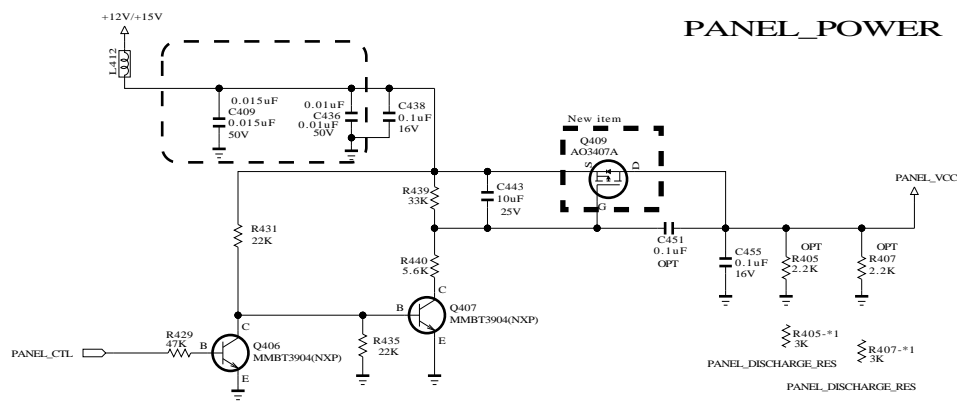
## FROM LIPS & POWER B/D



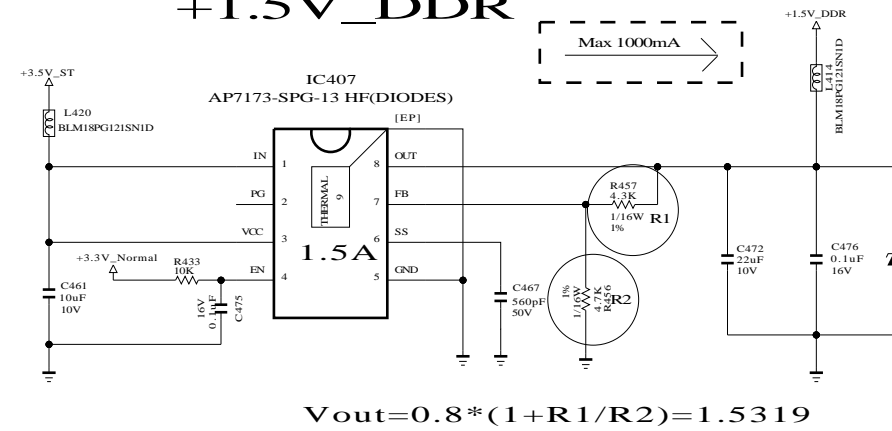
+5V\_Normal  
&  
+5V\_USB



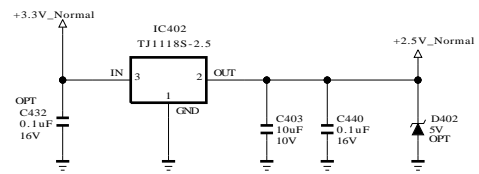
## PANEL\_POWER



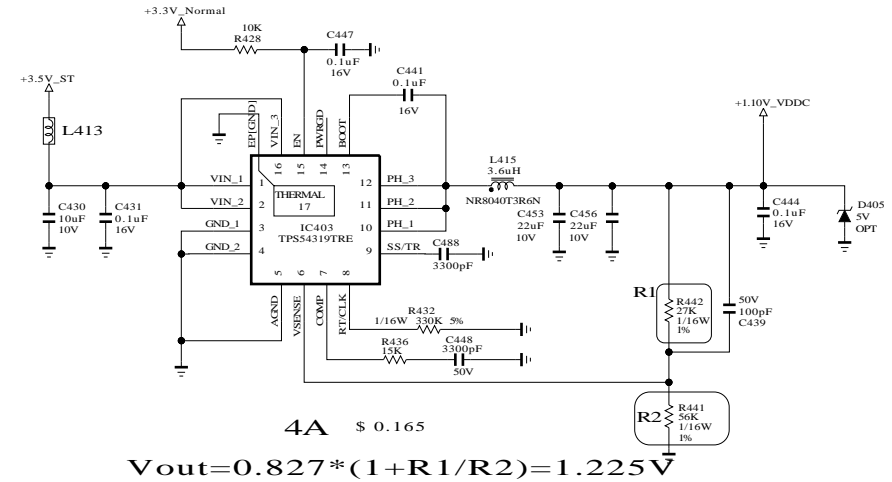
## +1.5V\_DDR



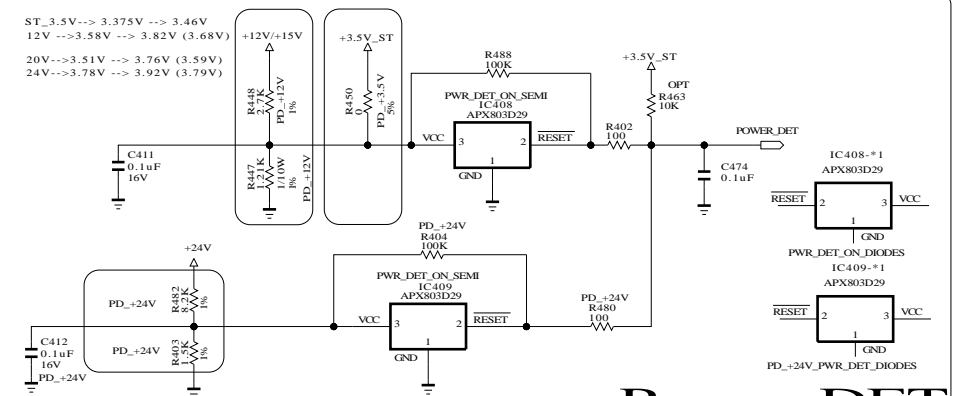
## +2.5 V/+1.8 V



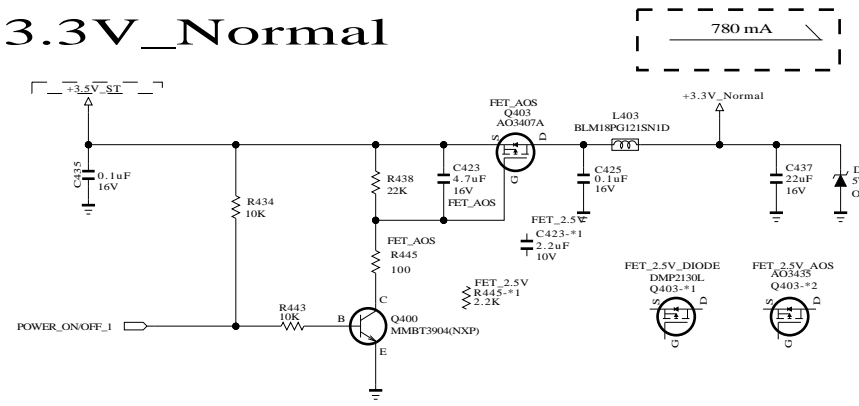
S7LR core 1.2V volt





## Power\_DET]



## +3.3V\_Normal



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SECRET

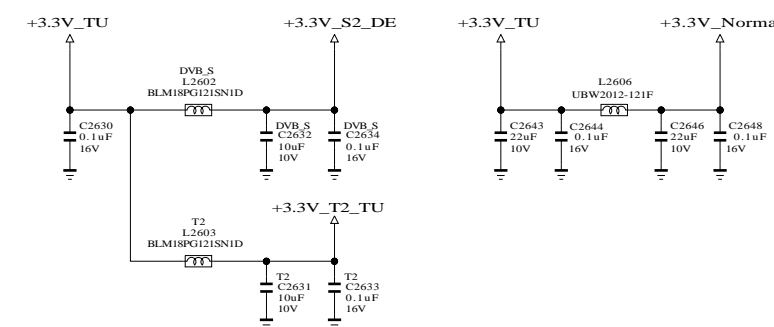
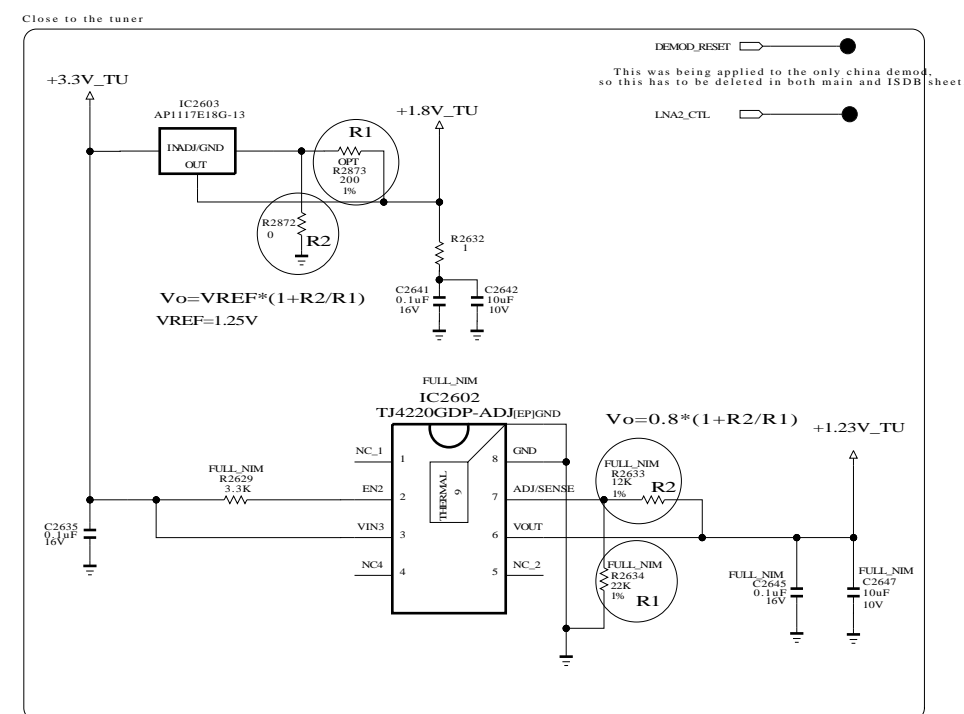
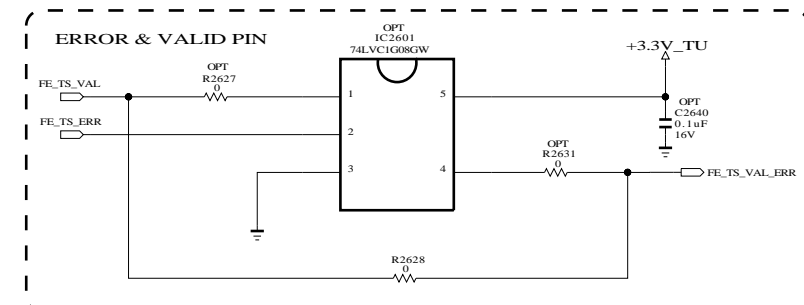
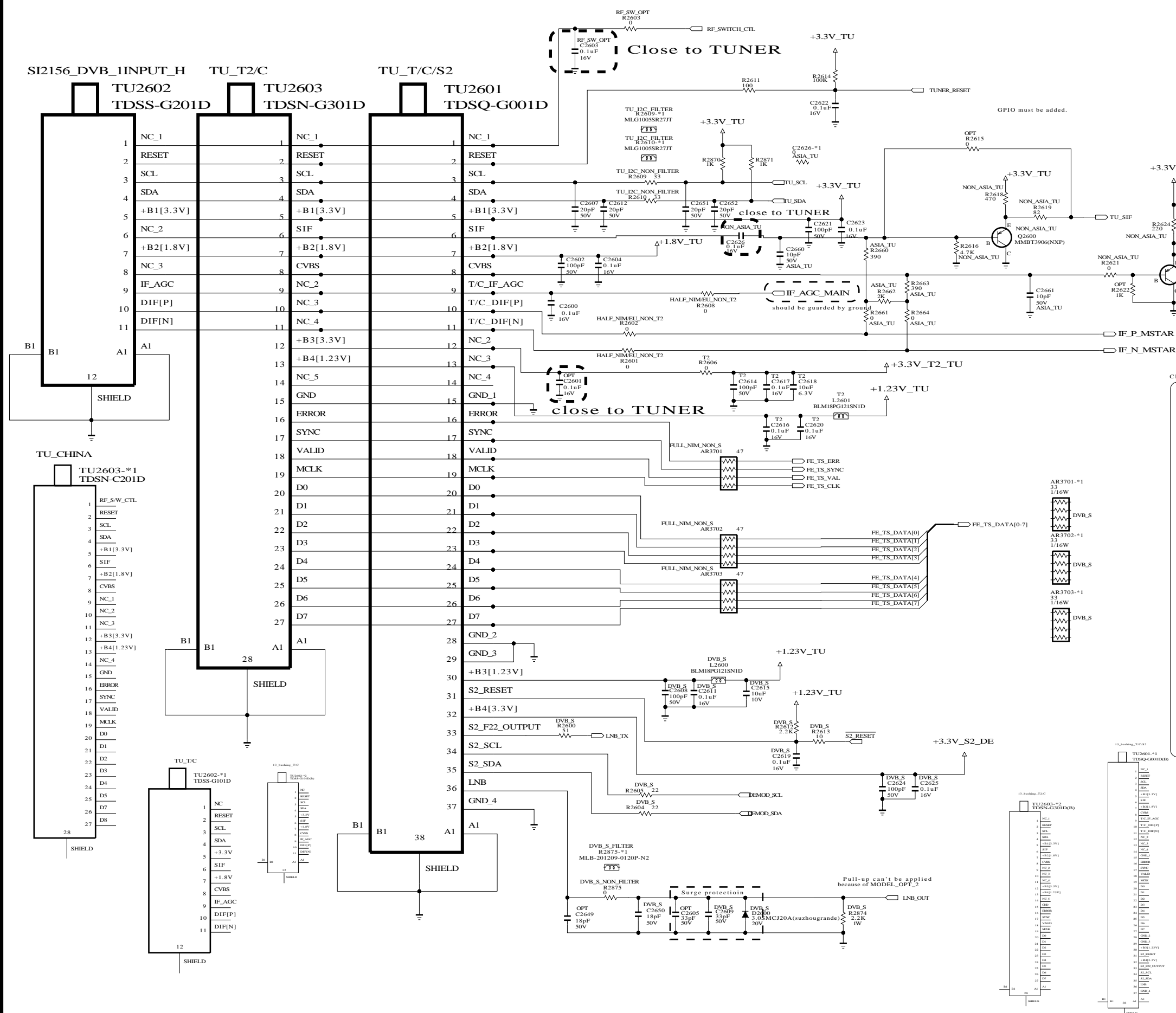
LG Electronics





EMEA INTERACTIVE

MODEL	LP63xH-ZA	DATE	2012.11.05
BLOCK	POWER_LARGE	SHEET	4/

# P4R\_GLOBAL\_TUNER\_BLOCK



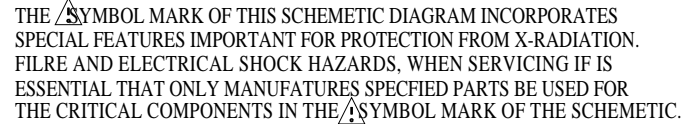
THE  MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  MARK OF THE SCHEMATIC.

SECRET

LG Electronics



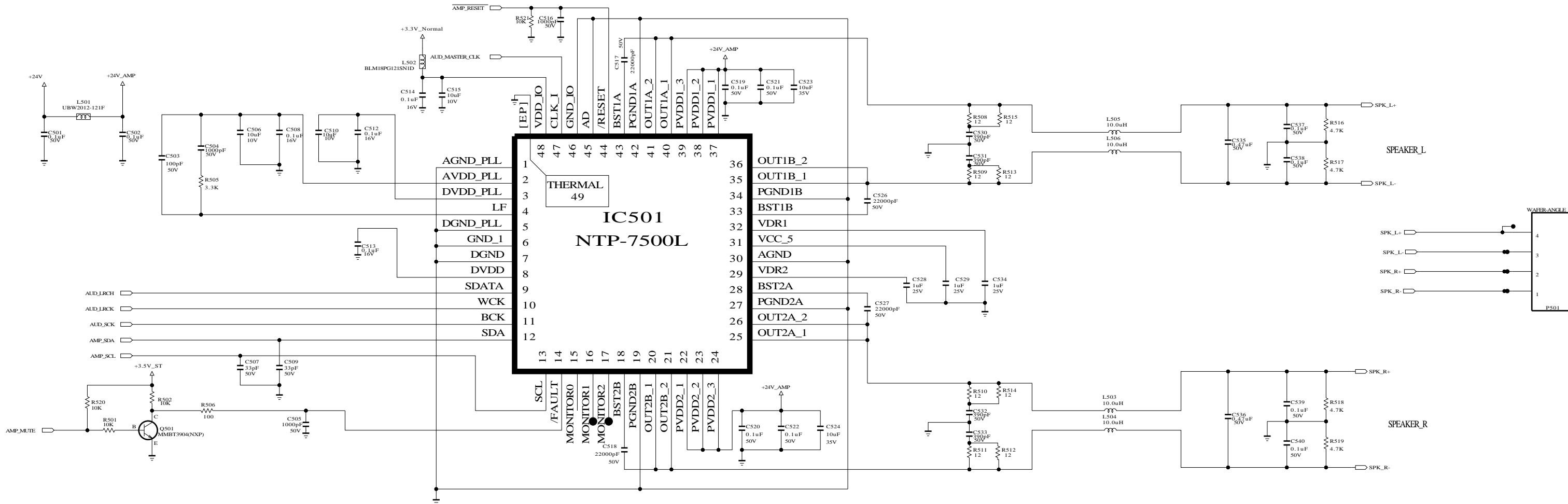
MODEL	LP63xH-ZA	DATE	2012/11/05
BLOCK	TUNER_EU	SHEET	26 /





LG Electronics



MODEL	LP63xH-ZA	DATE	2012.11.05
BLOCK	MAIN2, HW OPT	SHEET	2/

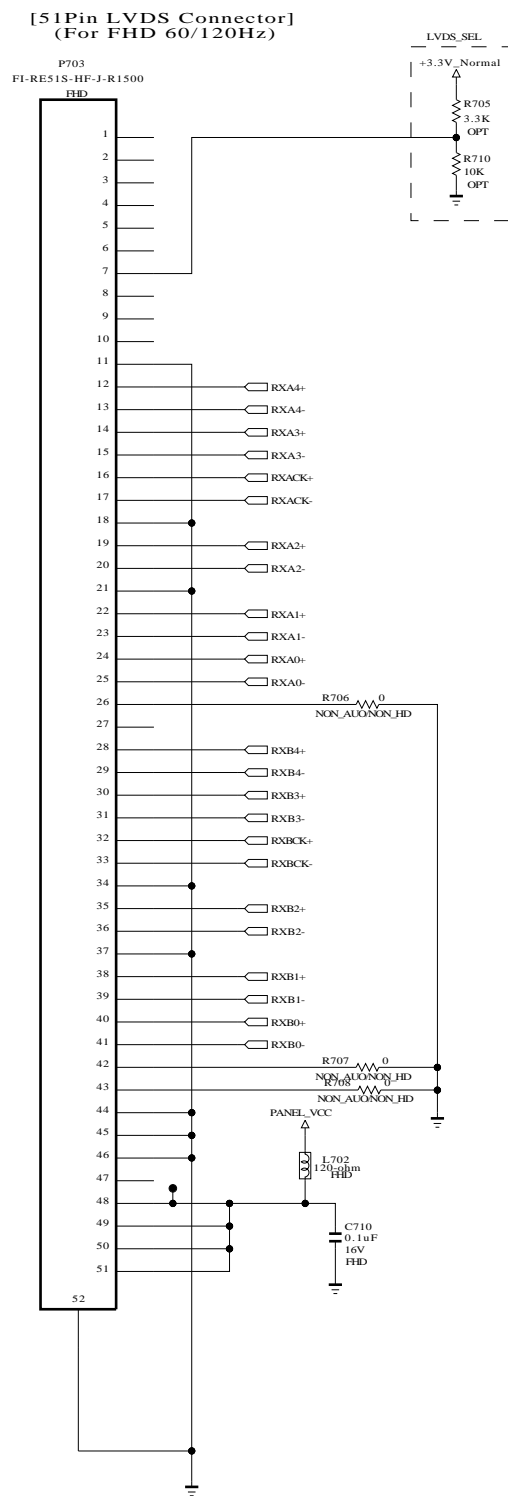


THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

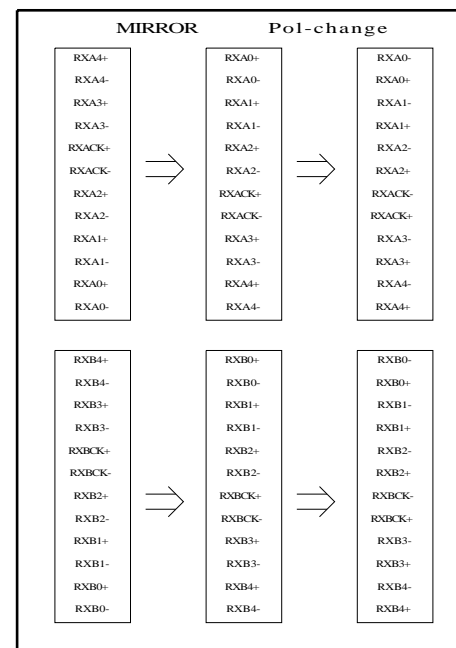
SECRET  
LGElectronics



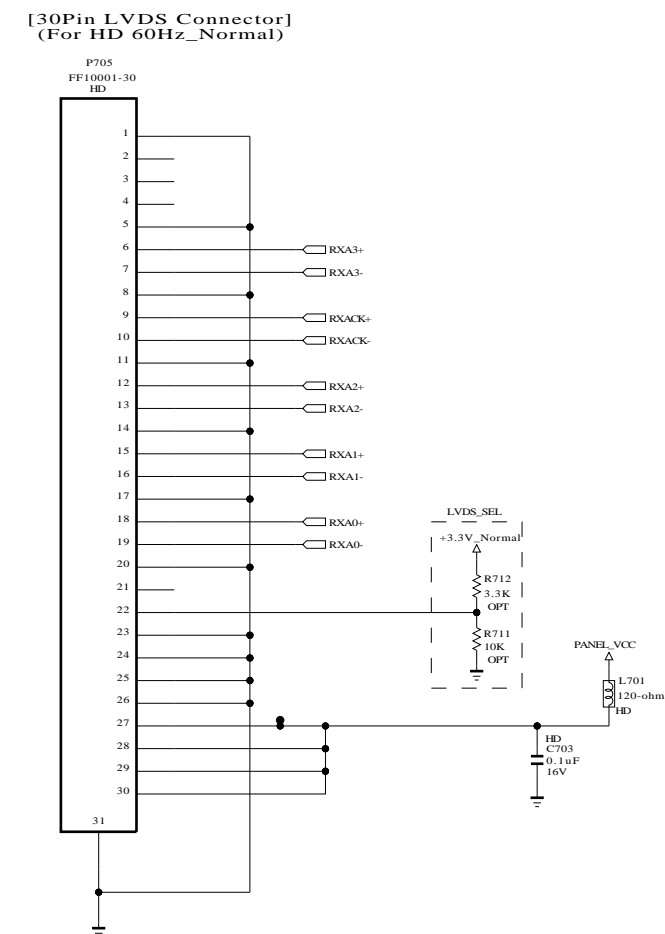
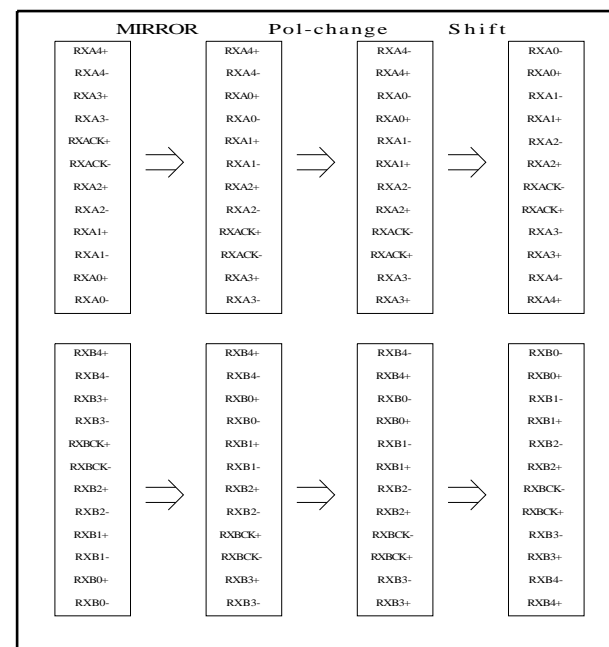
EMEA INTERACTIVE			
MODEL	LP63xH-ZA	DATE	2012.11.05
BLOCK	AUDIO AMP	SHEET	5



## FOR FHD REVERSE(10bit) Change in S7LR



## FOR FHD REVERSE(8bit) Change in S7LR



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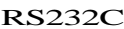
SECRET

LG Electronics

LG ELECTRONICS

EMEA INTERACTIVE

MODEL	LP63xH-ZA	DATE	2012.11.05
BLOCK	LVDS WAFER	SHEET	7 /



SECRET  
LGElectronics

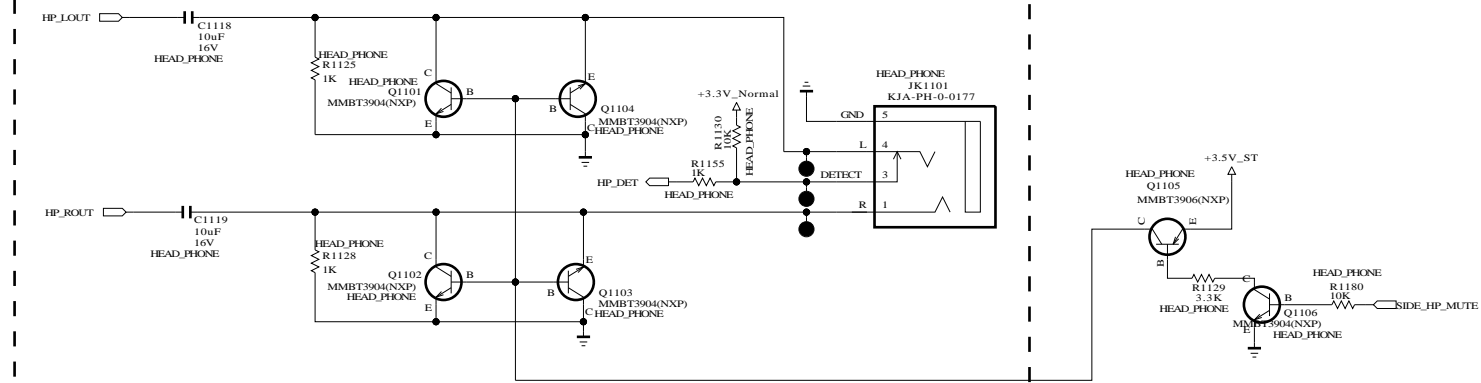


MODEL	LP63xH-ZA	DATE	2012.11.05
BLOCK	RS232C_9PIN	SHEET	1/1

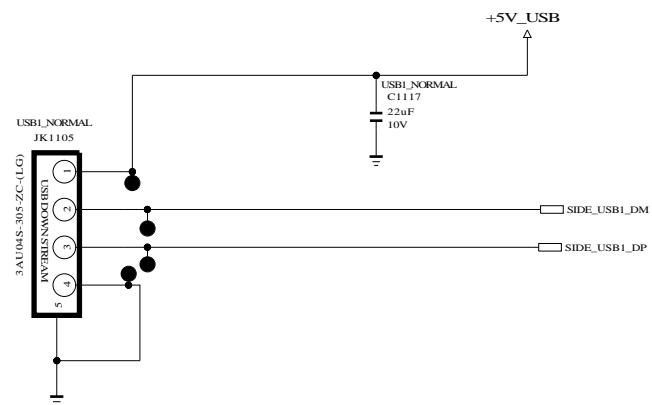


## RGB/SPDIF/PC/HP/USB

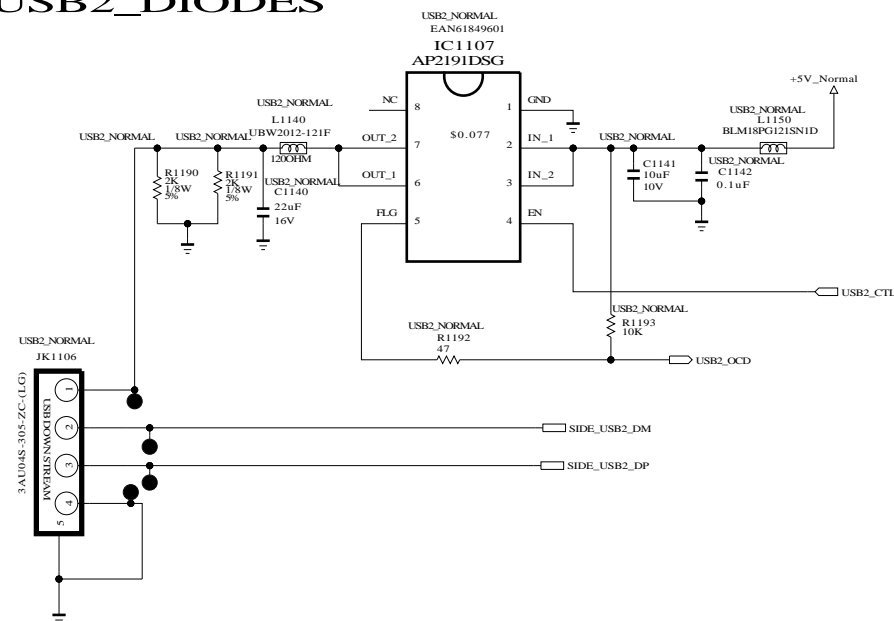
## EARPHONE BLOCK



## USB1\_DIODES

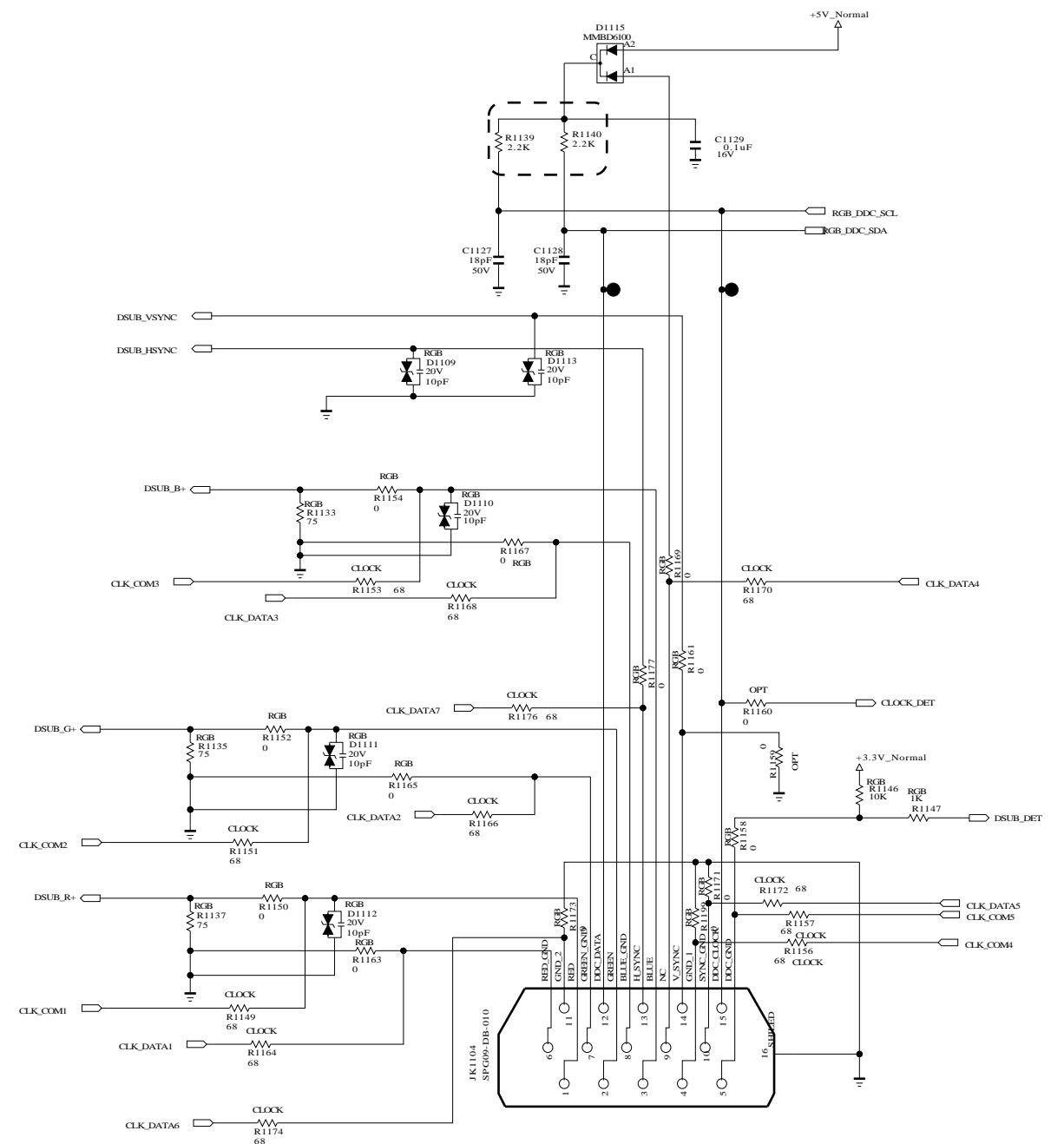
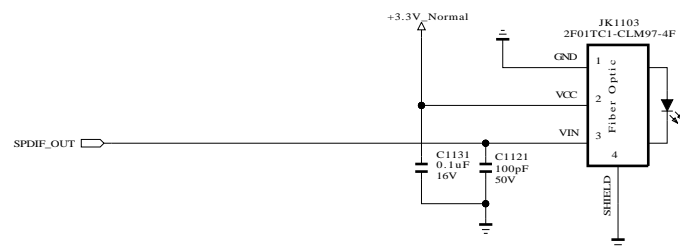


## USB2\_DIODES

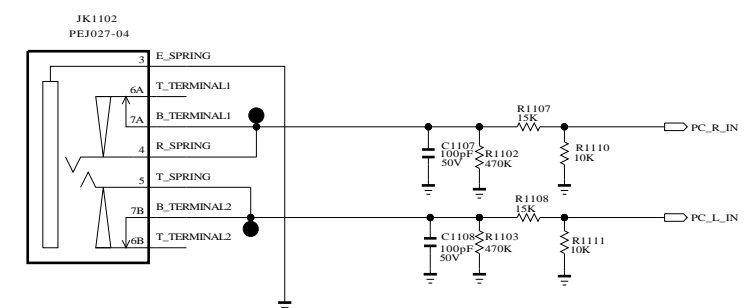




## SPDIF OPTIC JACK

### 5.15 Mstar Circuit Application



## PC/COMPONENT AUDIO



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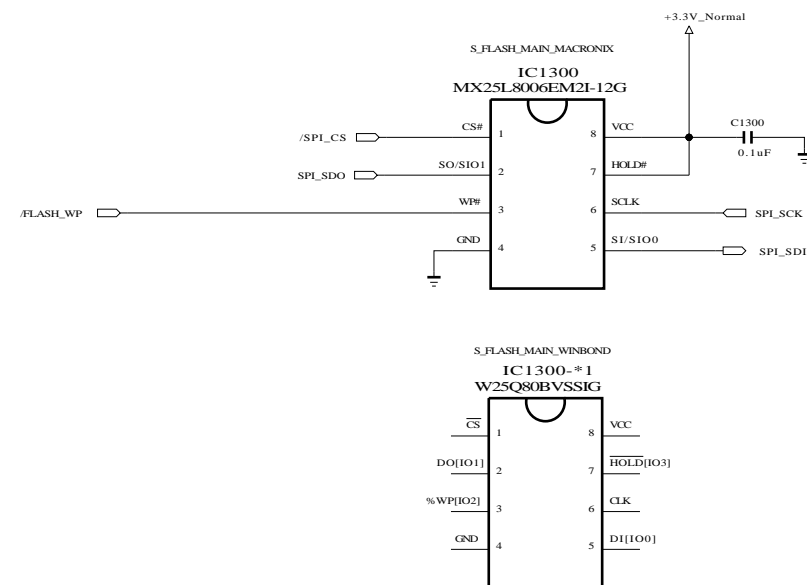
SECRET



LG Electronics



EMEA INTERACTIVE

MODEL	LP63xH-ZA	DATE	2012.11.05
BLOCK	INTERFACE	SHEET	1 / 1



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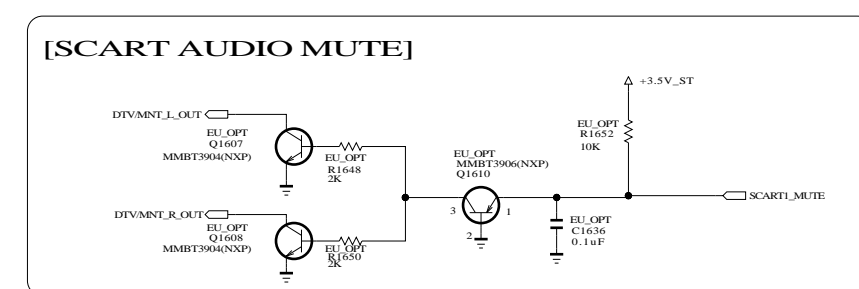
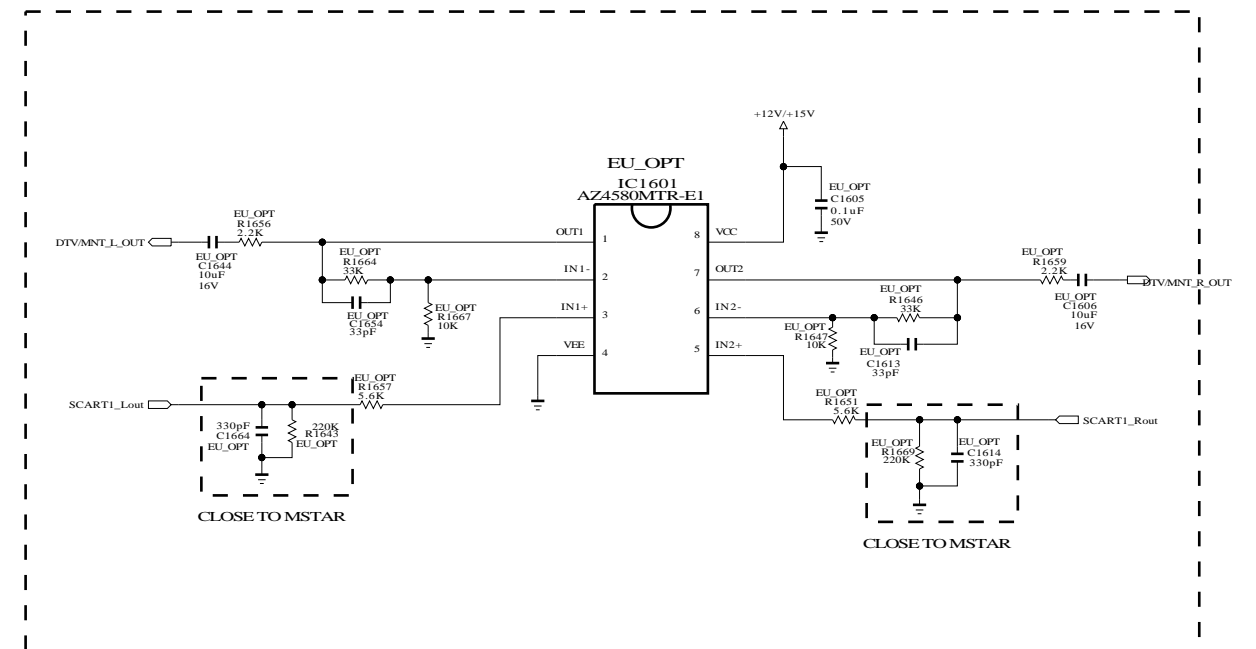
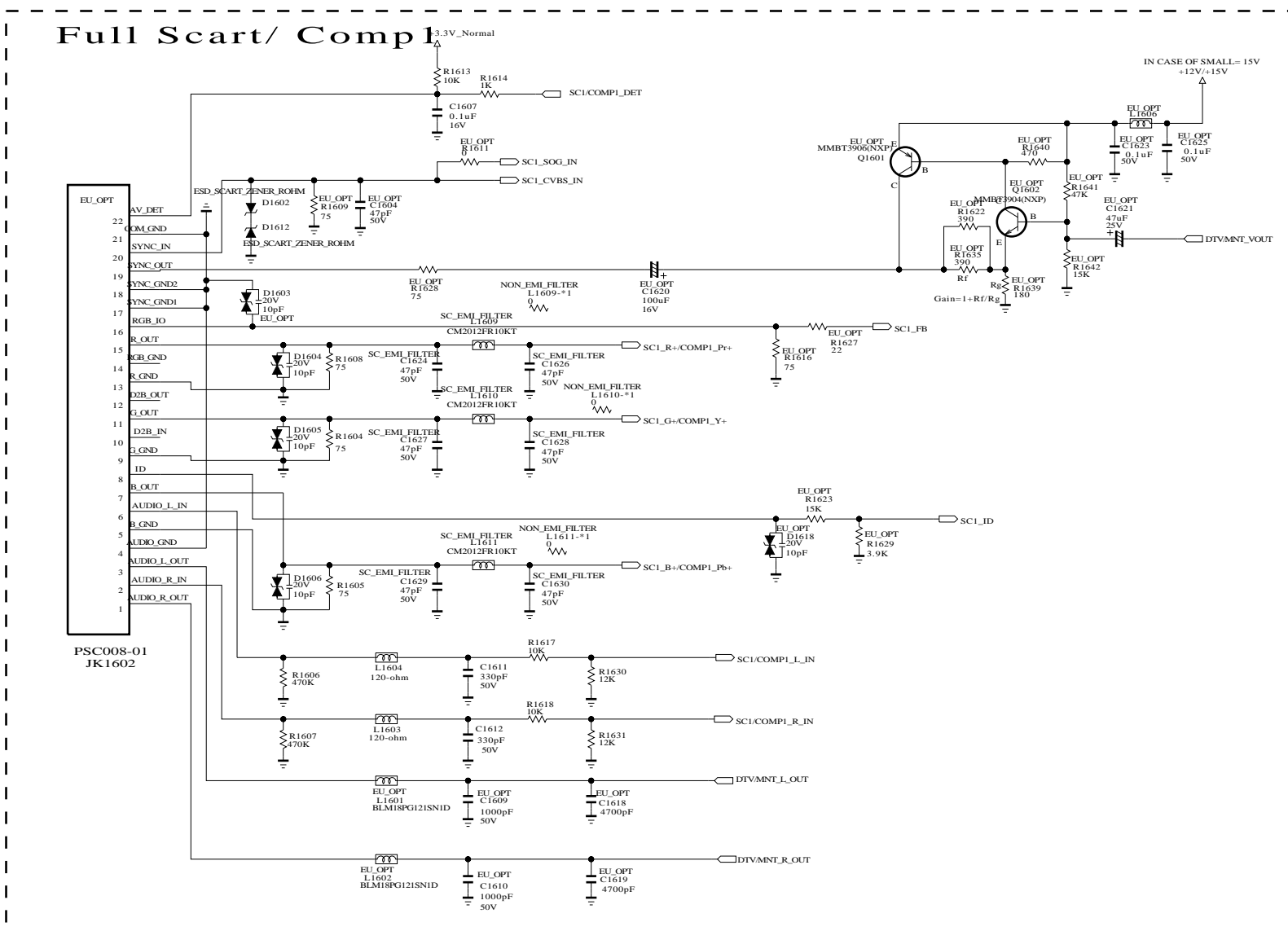
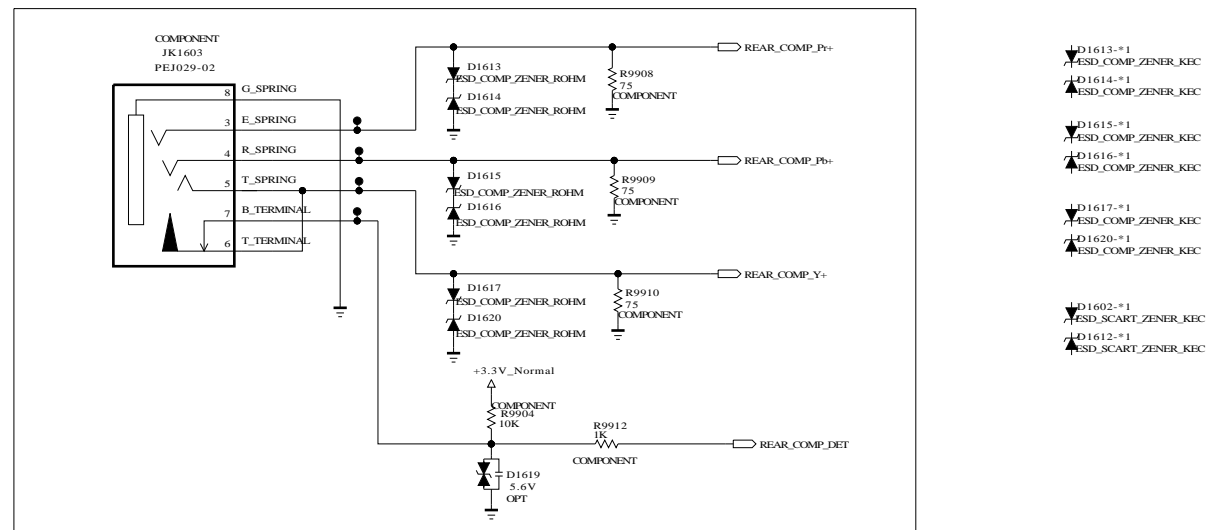
SECRET  
LGElectronics





EMEA INTERACTIVE

MODEL	LP63xH-ZA	DATE	2012.11.05
BLOCK	S-FLASH	SHEET	1 / 3

## REAR COMPONENT PHONE JACK



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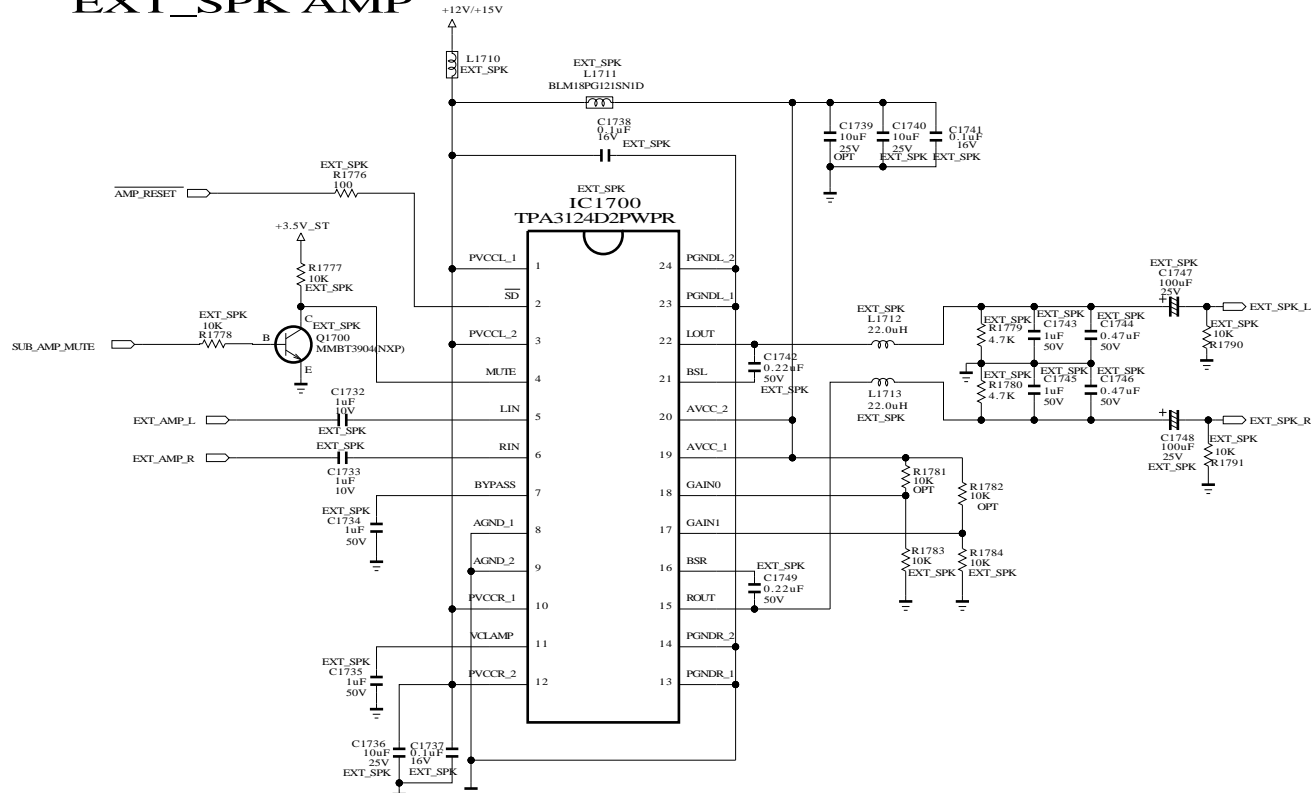
SECRET  
LGElectronics



EMEA INTERACTIVE

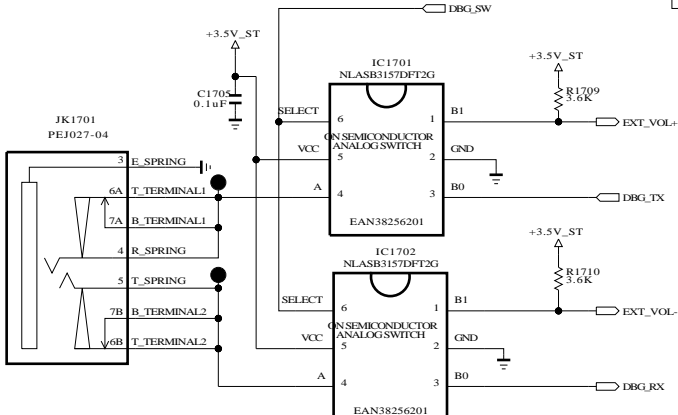
MODEL	LP63xH-ZA	DATE	2012.11.05
BLOCK	REAR JACK	SHEET	16

## EXT\_SPK AMP

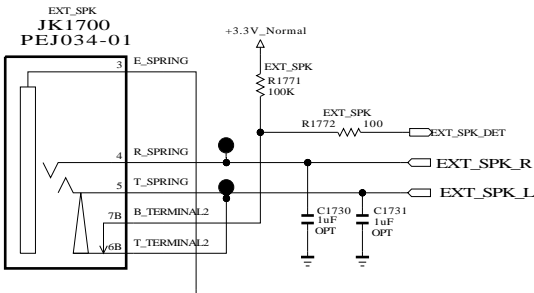


## EXT\_SPK\_CONTROL/DEBUG

DBG_SW	CONNECTION
L	A - B (DEBUG_NEC/MSTAR
H	A - B   EXT_SPK CONTROL

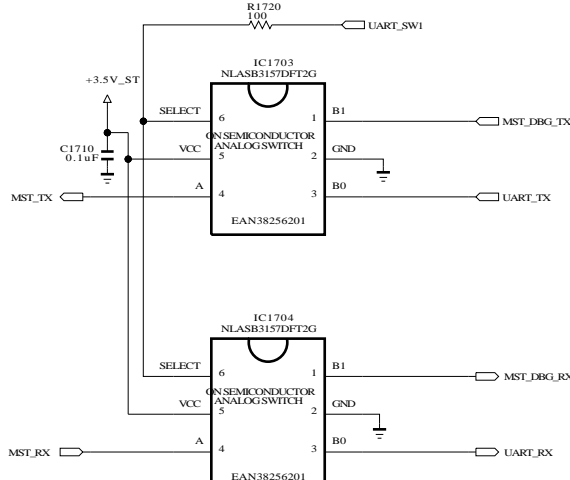


## EXT\_SPK OUT

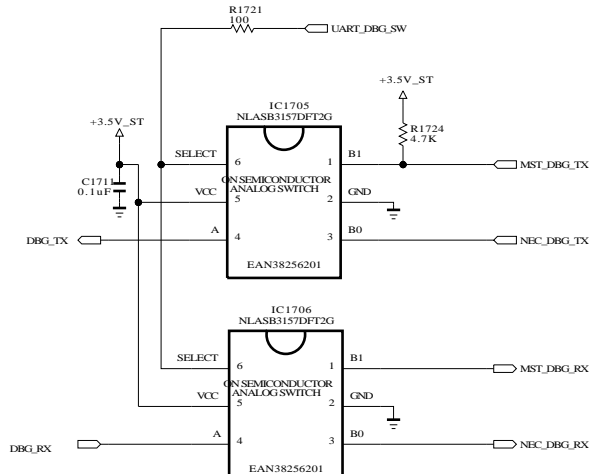


## UART/I2C SWITCH

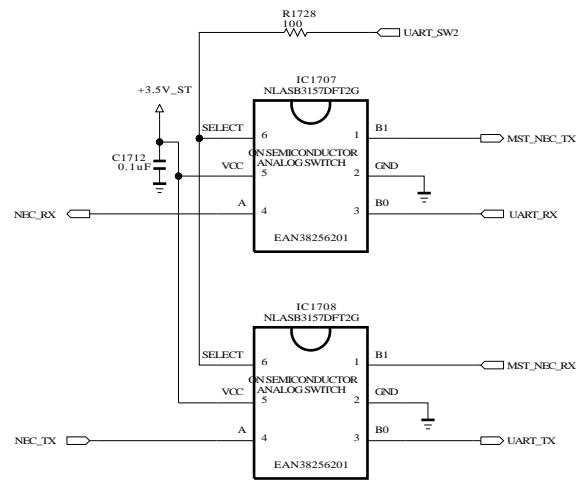
UART_SW1	CONNECTION
L	A - B0    MSTAR ADJ
H	A - B1    MSTAR DEBUG



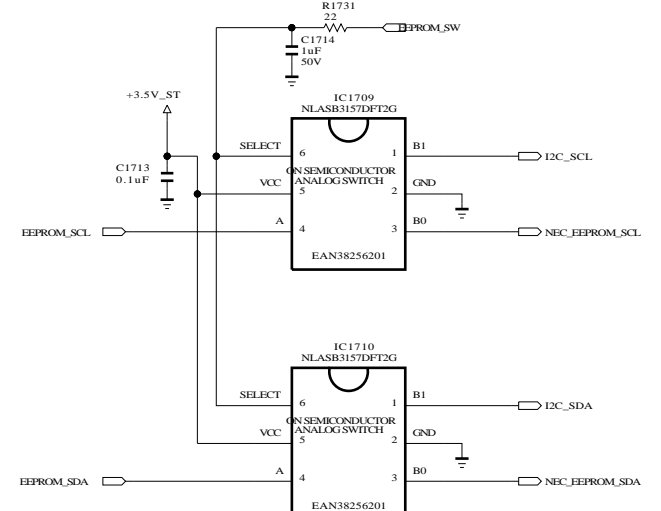
UART_SW	CONNECTION
L	A - B0 NEC DEBUG
H	A - B1 MSTAR DEBUG





UART_SW2	CONNECTION
L	A - B0 INTERACTIVE
H	A - BNEC USB_DOWNLOAD



EEPROM_SW	CONNECTION
L	A - B0 NEC-EEPROM
H	A - B1MSTAR-EEPROM



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SECRET

LG Electronics

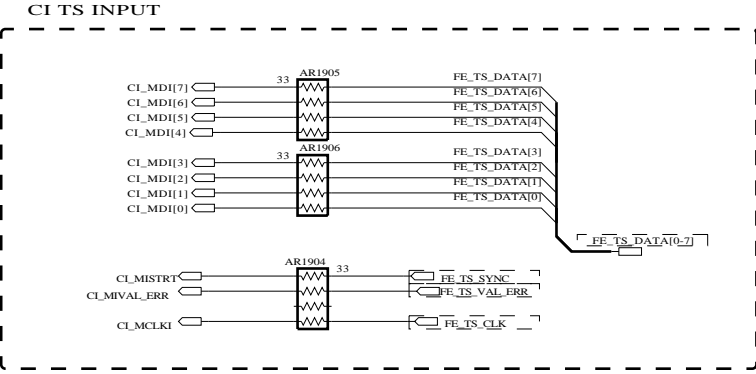
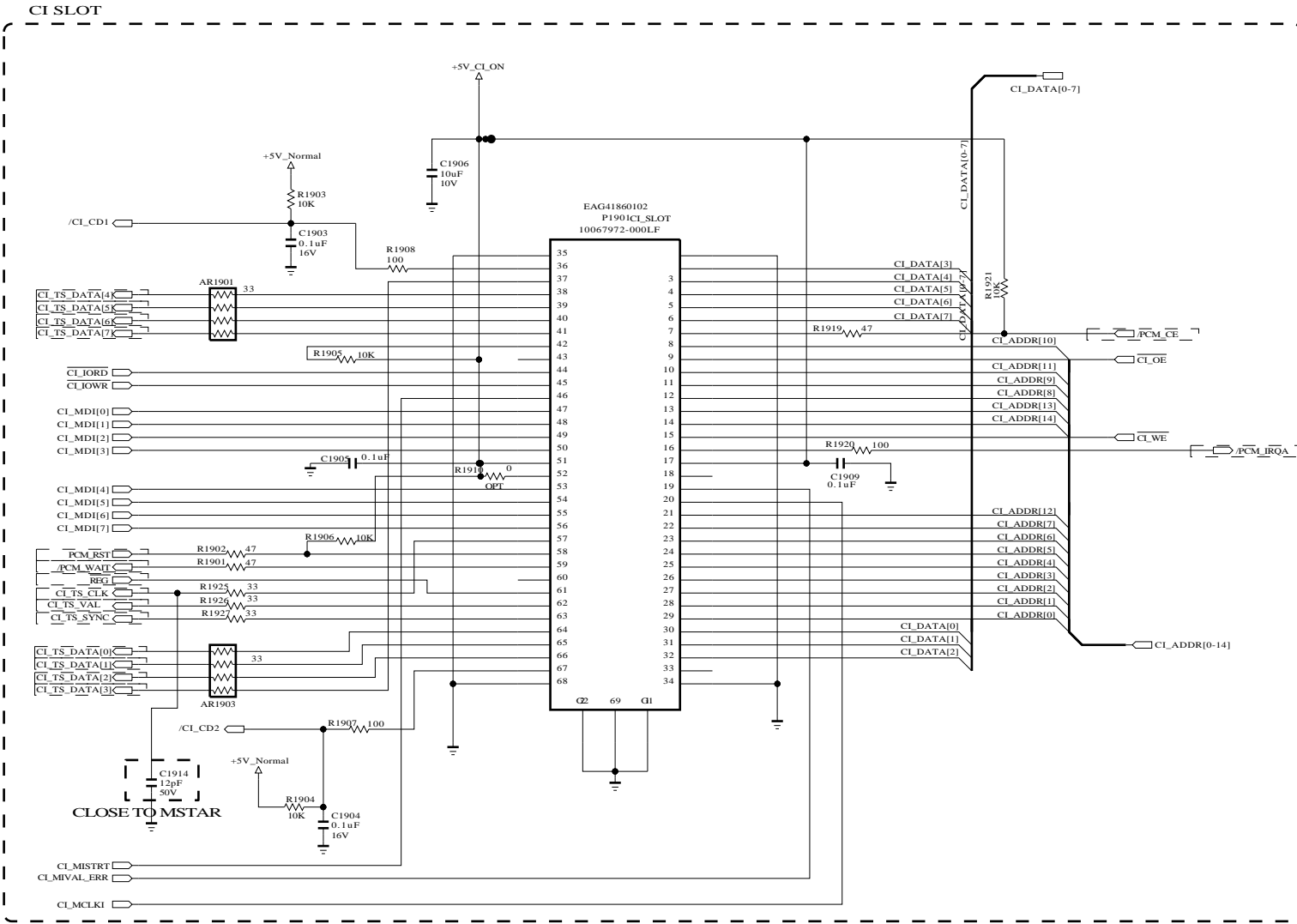


EMEA INTERACTIVE

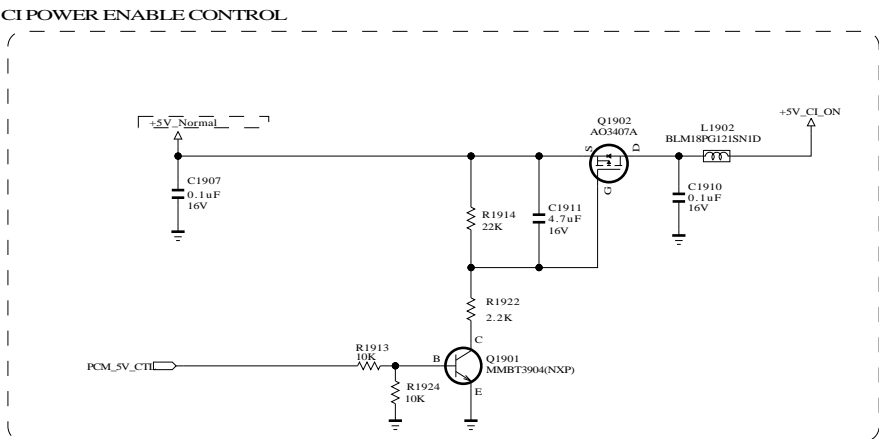
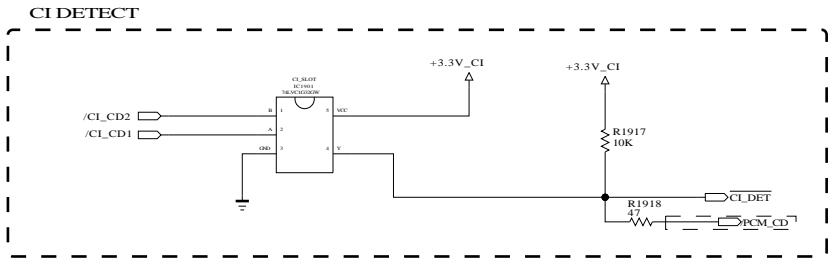
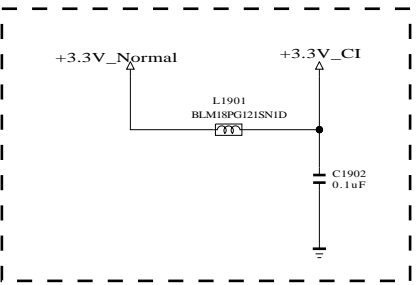
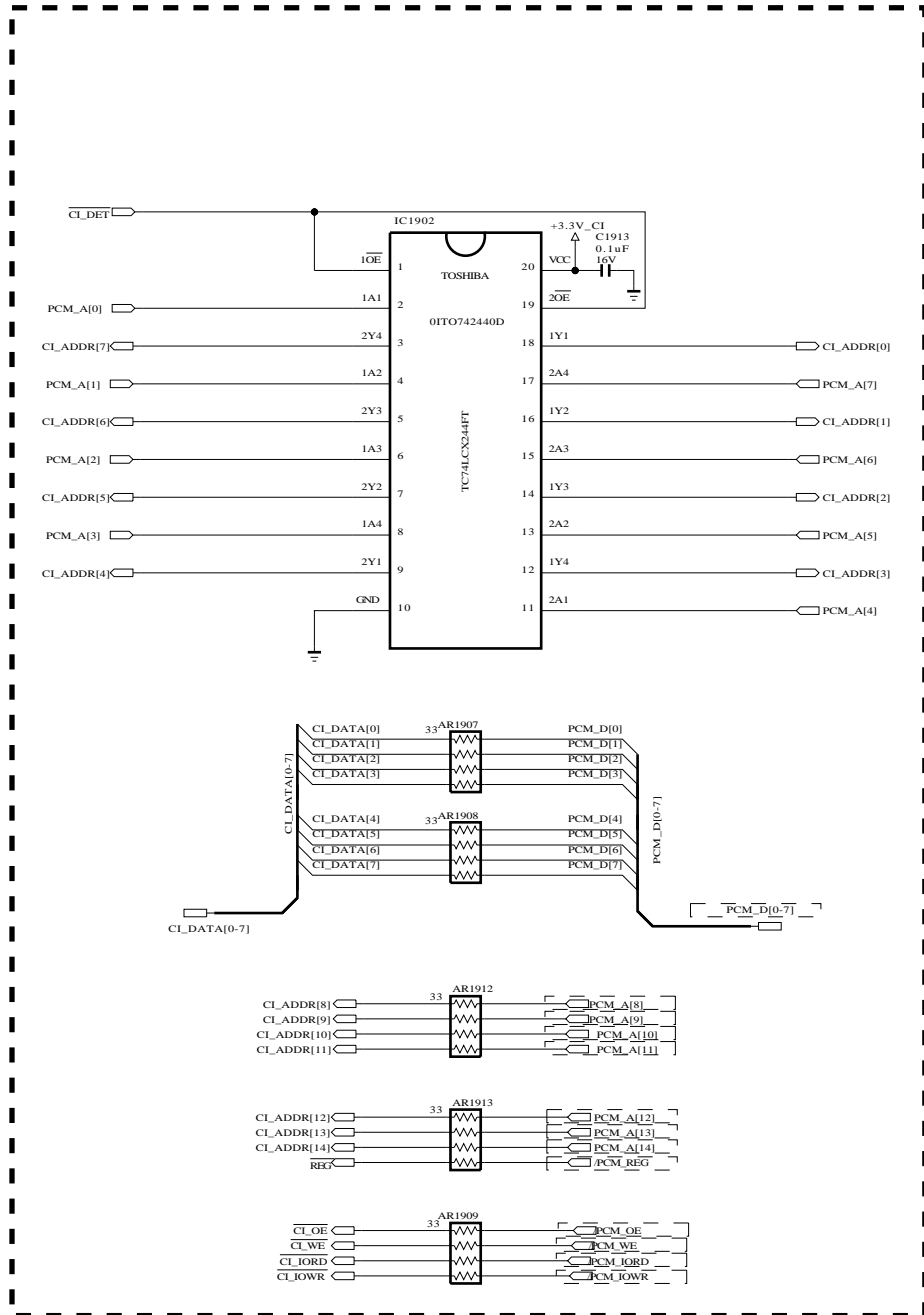
MODEL	LP63xH-ZA	DATE	2012.11.05
BLOCK	EXT SPK	SHEET	17



## CI Region

\* Option name of this page : CI\_SLOT  
(because of Hong Kong)



## CI HOST I/F



THE  MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  MARK OF THE SCHEMATIC.

SECRET

LG Electronics

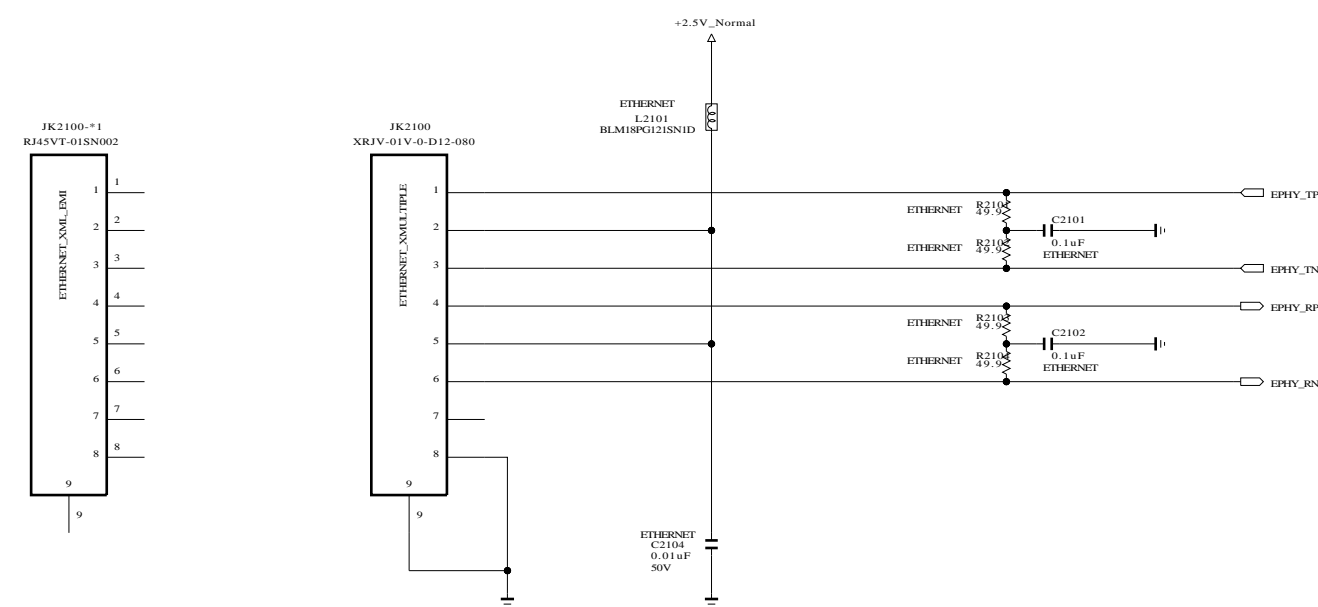


EMEA INTERACTIVE

MODEL	LP63xH-ZA	DATE	2012.11.05
BLOCK	PCMC	SHEET	19

# ETHERNET

\* H/W option : ETHERNET



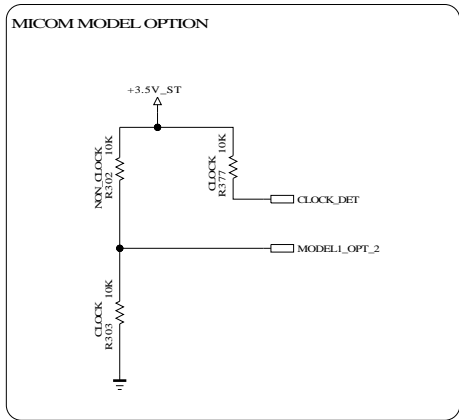
THE /S SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE /S SYMBOL MARK OF THE SCHEMATIC.

SECRET

LG Electronics

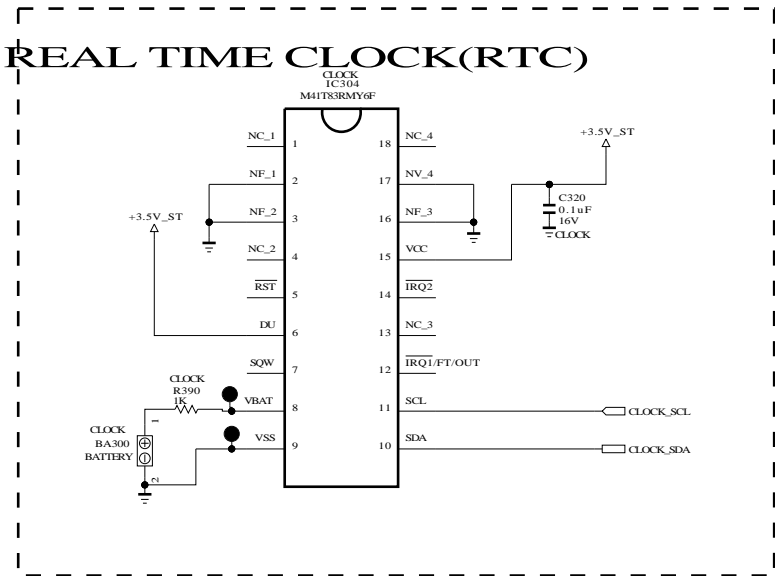
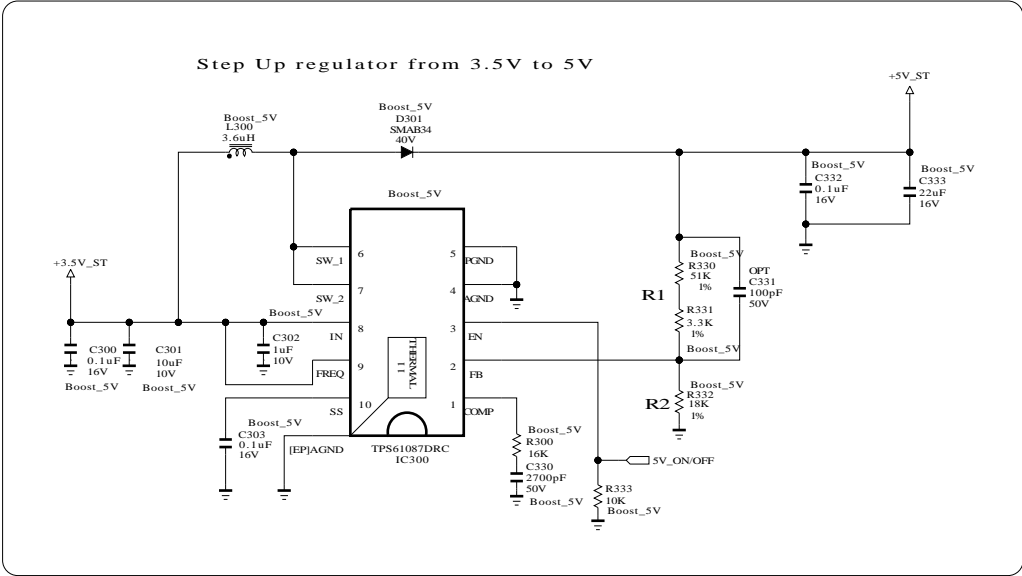
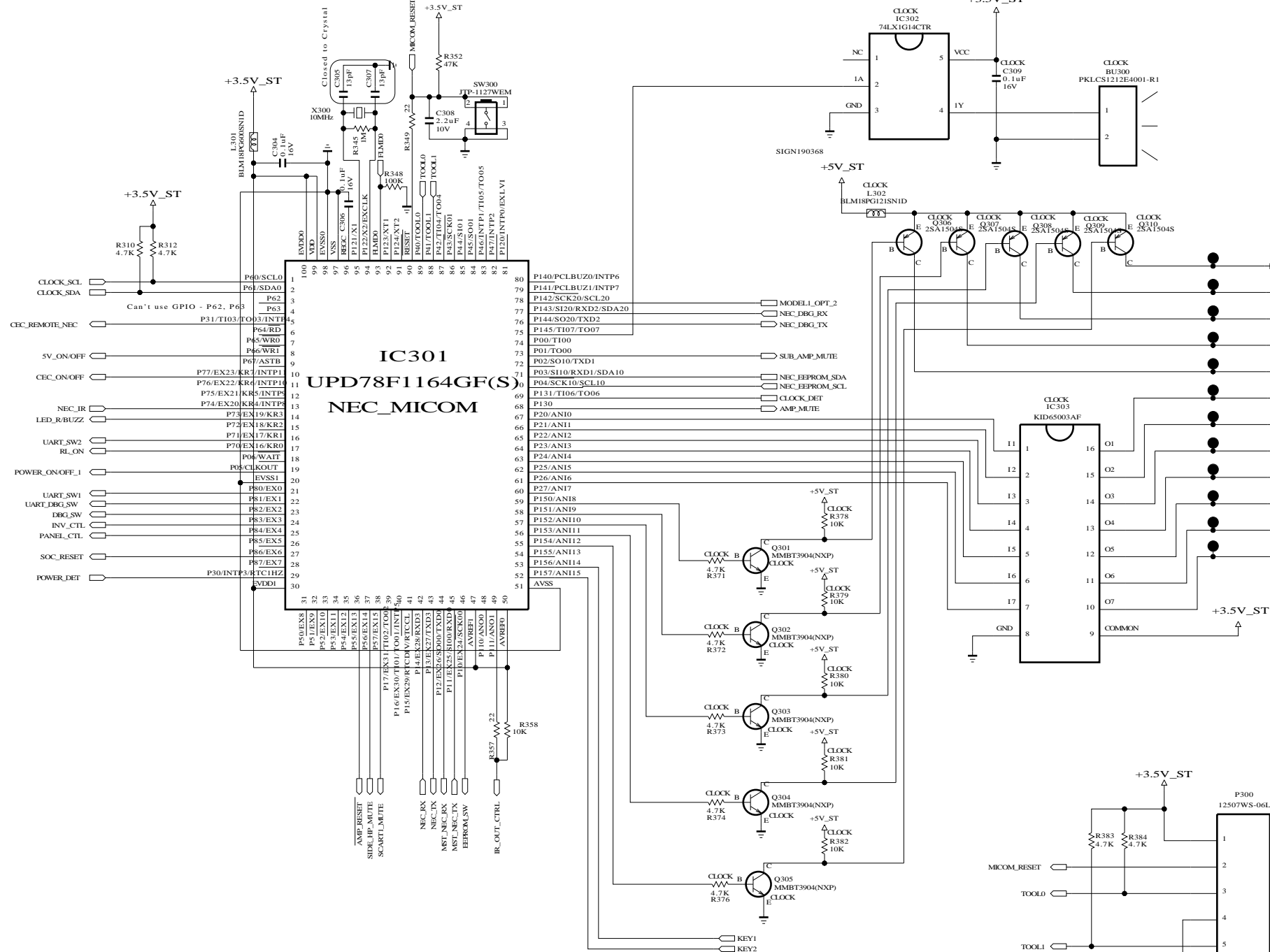
LG ELECTRONICS

MODEL	LP63xH-ZA	DATE	2012/11/05
BLOCK	LAN	SHEET	21 /



MODEL OPTION

PIN NAME	PIN NO.	HIGH	LOW
MODEL1_OPT_0	80	OPT	OPT
MODEL1_OPT_1	79	OPT	OPT
MODEL1_OPT_2	78	NON_CLOCK	CLOCK
CLOCK_DET	69	CLOCK	OPT



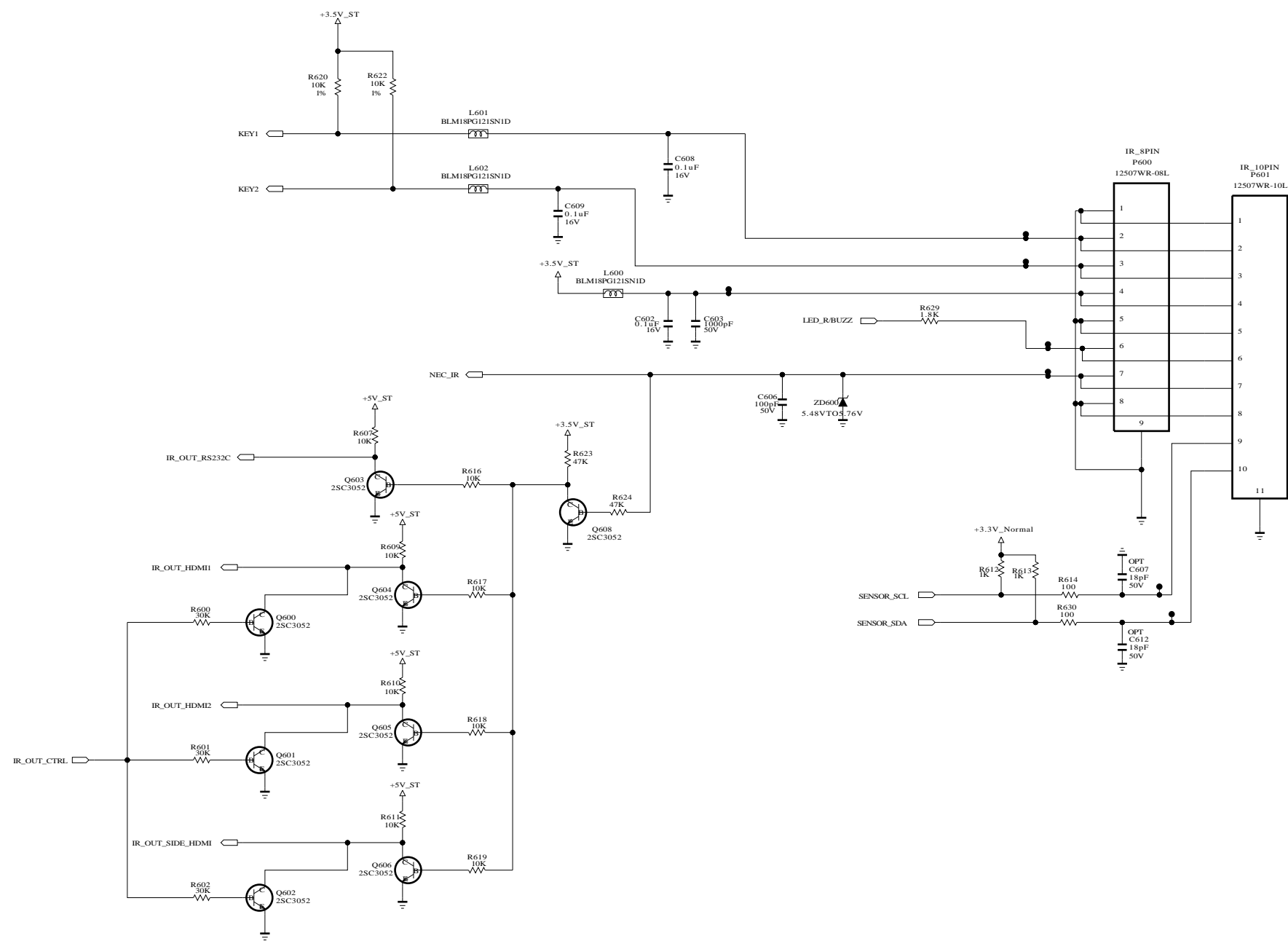
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.



SECRET  
LGElectronics



EMEA INTERACTIVE			
MODEL	LP63xH-ZA	DATE	2012.11.05
BLOCK	SUB MICOM	SHEET	3 /

CONTROL  
IR & LED



THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

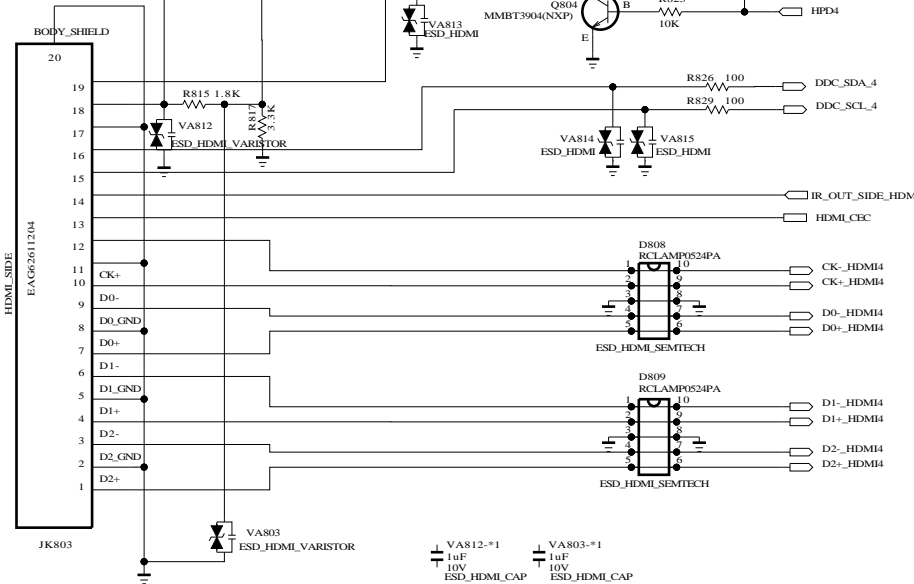
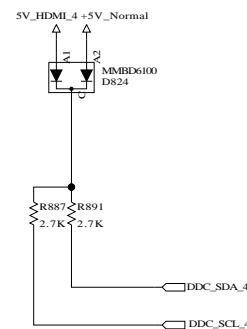
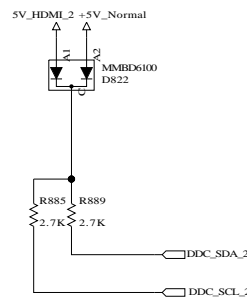
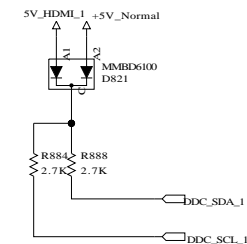
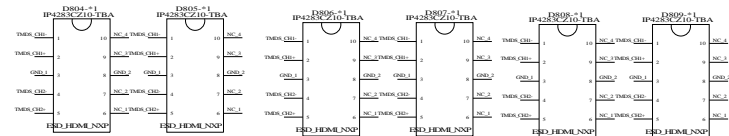
SECRET  
LGElectronics



EMEA INTERACTIVE

MODEL	LP63xH-ZA	DATE	2012.11.05
BLOCK	IR/CONTROL	SHEET	6/



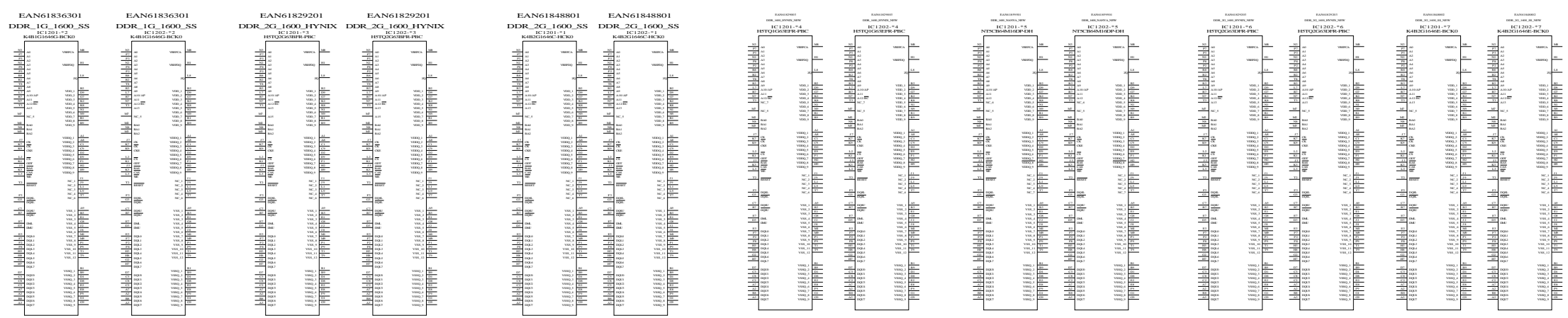
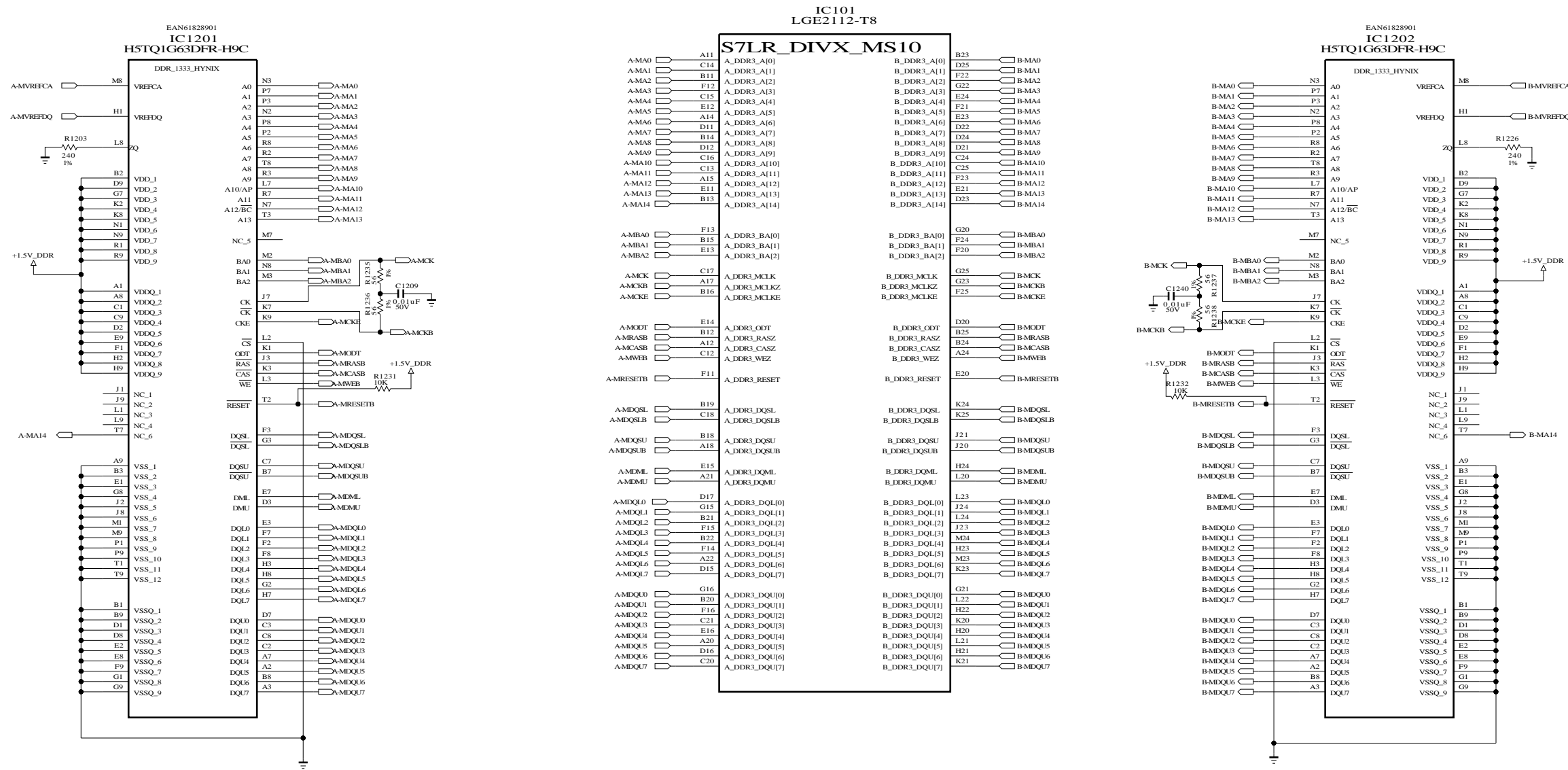
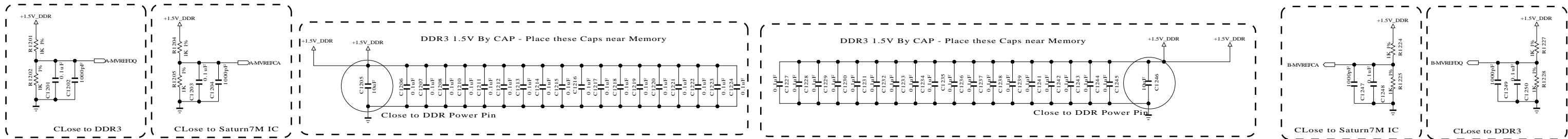




LG Electronics



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8/



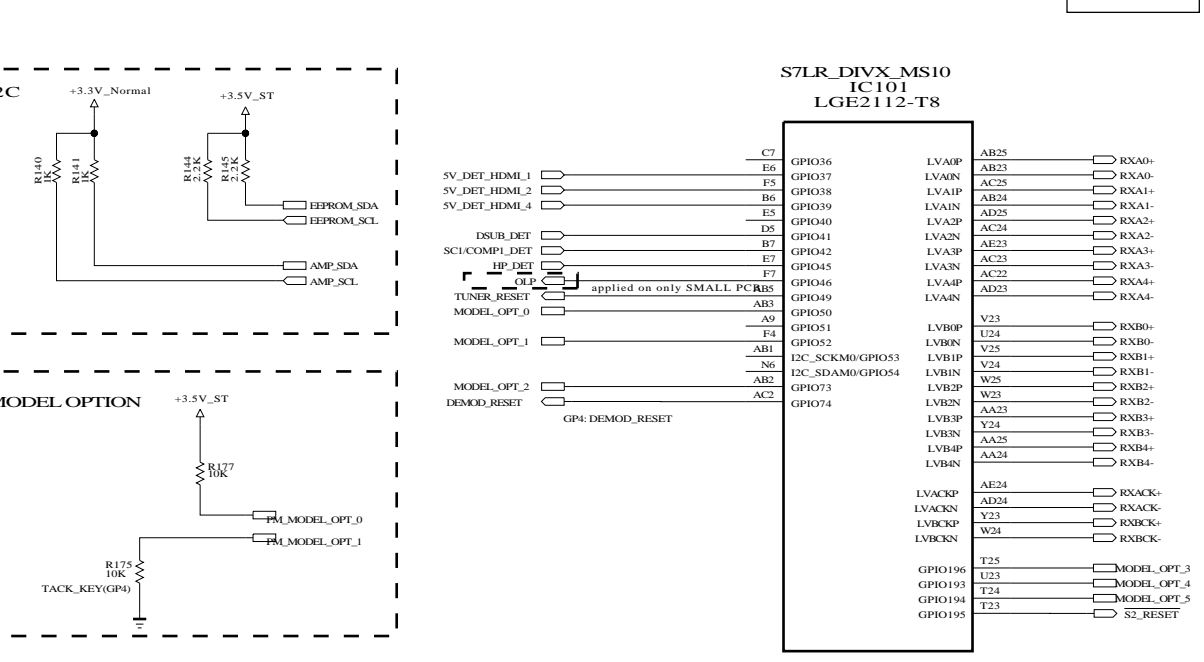
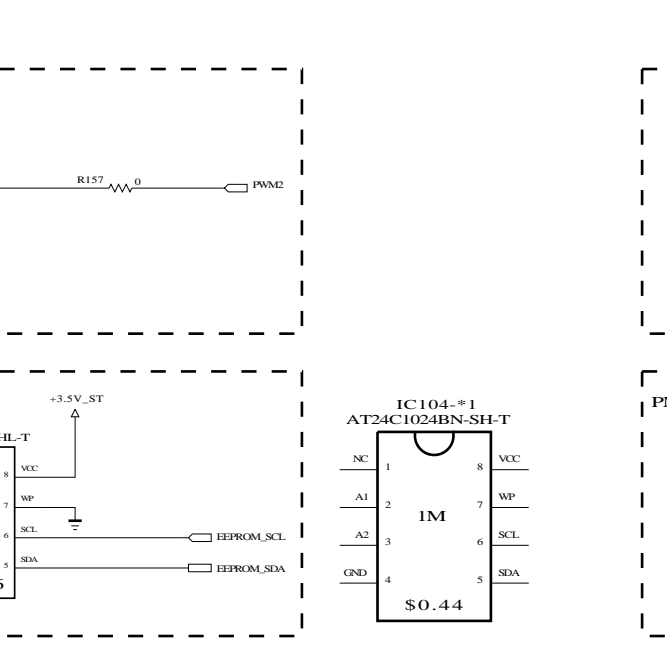
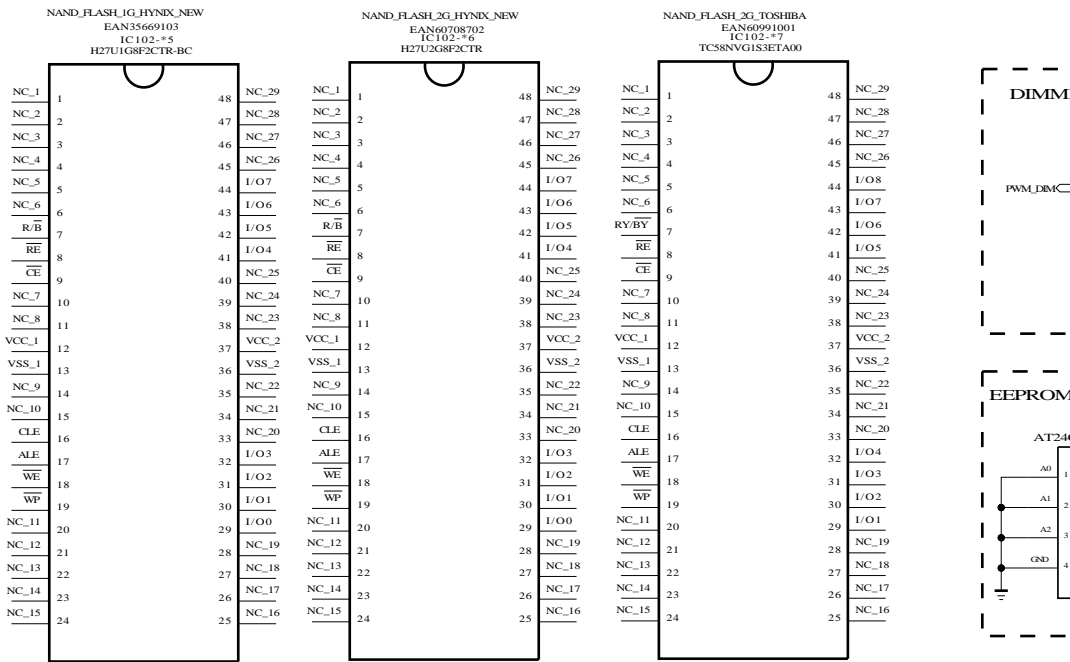
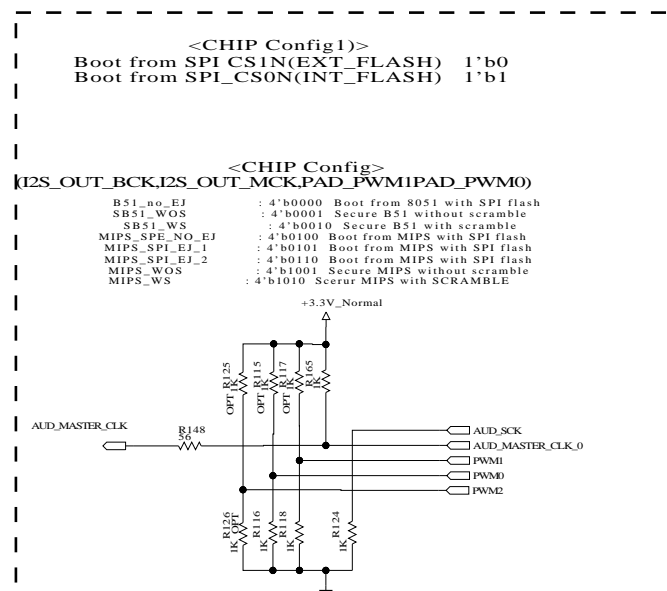
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SECRET  
LGElectronics



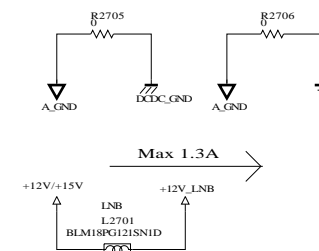
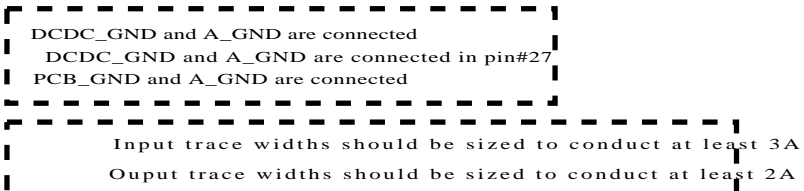
EMEA INTERACTIVE

MODEL	LP63xH-ZA	DATE	2012.11.05
BLOCK	DDR	SHEET	1 / 2



MODEL	LP63xH-ZA	DATE	2012.11.05
BLOCK	FLASH/EEPROM/GPIO	SHEET	1 /

(Option:LNB)



SECRET	 LG ELECTRONICS
LGElectronics	

MODEL	LP63xH-ZA	DATE	2012/11/05
BLOCK	DVB_S	SHEET	27 /

